

# MOTOR AGE

Vol. XXX  
No. 1

CHICAGO, JULY 6, 1916

Ten cents a copy  
Three dollars a year

## *Hudson Super-Six Endures The Supreme Test*

The Hudson Super-Six, in many a test, has proved itself the greatest car that's built. No car has ever matched it in hill-climbing. No other stock car ever went so fast. None ever went so far at top speed. And no motor of its size ever showed such reserve power.

### **Best Record By 52%**

A Hudson Super-Six with stock chassis was driven 1819 miles in 24 hours on the Sheepshead Bay track on May 2nd. The average speed was 75.8 miles per hour.

That car, in a single round of the sun, went the distance from New York to Denver. It went 52 per cent farther than any other stock car had ever gone in that time. One man drove it all the way. No man could do that in a car which was not vibrationless. That man went farther in 24 hours than a man ever traveled before.

### **50 Miles In One**

Some engineers figure that one mile at racing speed equals 50 miles of ordinary driving, in wear and strain on motor.

This car had run 2,000 miles before that test, at average speed of 80 miles per hour. So this 24-hour run made 3,800 miles which the car had been run at top speed—as high as 102 miles per hour. Yet no part or bearing, when the engine was inspected, showed any appreciable wear.

### **The Thing You Want**

What you want in a car above all else is reliability. And that's what these tests are proving. It would take ten years of road work, perhaps, to show what we prove in a few days of speed work. In all our tests we use a stock chassis.

*While we are not now in a position to add new dealers with assurance of immediate deliveries, still we solicit correspondence from established dealers who are now making plans for the future*

**7-Passenger Phaeton, \$1475 at Detroit (Seven other styles of open and closed bodies)**

**Hudson Motor Car Company, Detroit, Mich.**

The motor is exactly the same as in every Hudson Super-Six. So every man who buys a Super-Six gets the same super-endurance.

### **Excels Costly Racing Cars**

At Sheepshead Bay speedway, at Chicago, and on other race tracks Hudson Super-Sixes—practically stock—showed greater stamina than the costliest special racing cars.

While great racing motors went to pieces under the terrific strain, the Hudsons ran through grueling contests without a stop.

Their speed was not always equal to winning first prizes, though they always were "in the money" and always were the sensation of the race because of their marvelous staying powers.

### **A Patented Motor**

The Super-Six motor is a Hudson invention, controlled by Hudson patents. The principle which gives its utter smoothness is entirely new. That is why it out-performs any other car that's built.

It develops 76 horsepower from a small, light Six. That is 80 per cent more than old types. You rarely use that power. In ordinary driving you run at half its capacity, so the motor is never strained. But the owner of a Super-Six knows that he has the power. He knows that his car is a master. He knows that in speed, in hill-climbing, in quick pick-up, no car can do what his does.

He takes pride in those facts. But his chief satisfaction lies in the car's endurance. He knows that his car will last. That another car at half the price might cost more in the long run.

Don't consider a fine car until you know the Super-Six. You would surely face years of regret.



# *Stewart* **\$350**

## Warning Signal

Hand Operated

**E**VEN a weak little buzzer or an old time bulb horn sounds big and commanding when demonstrated indoors.

Motorists are demanding for their life's sake a signal that sounds sure safety out in the din of traffic.

So many thousands demanded this Stewart Safety last year that our production is doubled and the price lowered to \$3.50.

Display this Stewart.

It sells itself.

*"No car is better than its accessories"*

The Stewart-Warner Speedometer Corporation  
Chicago, Illinois, U. S. A.





# MOTOR AGE

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## ANNOUNCEMENTS

In "What the Car Factory's Service Department Means to the Owner," which is the feature article of Motor Age for July 13, a former chief of the service department of a big motor car manufacturer tells the system of operation of service to owners and how they can get the most out of it.

## How the MILLER Carburetor Sales Corporation Got a Wedge Entered in a Highly Competitive Field

Read Mr. Goodnow's letter. It points a moral to manufacturers of new products with plenty of competition facing them.

### MILLER CARBURETOR SALES CORPORATION

Sole Agents  
Miller Carburetors

Chicago

Los Angeles

Motor Age,  
Mallers Bldg.,  
Chicago.

Gentlemen:—

We cannot refrain from taking this opportunity to inform you of the splendid results we are achieving through MOTOR AGE.

Due to the close competition and the long established position of the concerns in our field, we did not expect immediate response to our advertising. We were rather content to build a structure for the future.

Knowing conditions as you undoubtedly do, we believe that you will be as agreeably surprised as we when we tell you that in reply to our first three full-page advertisements which appeared in MOTOR AGE we have received over 300 inquiries from leading jobbers, dealers, and car owners. The inquiries continue to pour in at the rate of over 25 per day.

We attribute the results to a good product and to good advertising in a good paper.

Very truly yours,  
(Signed) F. C. GOODNOW.

No more conclusive proof of MOTOR AGE responsiveness than these results could be forthcoming.

Possibly MOTOR AGE holds the solution of similar problems besetting you. Write us.

**MOTOR AGE**  
MALLERS BUILDING, CHICAGO



To the best of our knowledge  
no WHITE TRUCK has ever  
worn out in commercial service

THE  
WHITE COMPANY  
CLEVELAND

When Writing to Advertisers, Please Mention Motor Age

360184



# MOTOR AGE



## Motor Camping *in the* Rockies

*By W.A. Lippman*

### Tips to the Tenderfoot Tourists

#### In Two Parts—Part I

**T**O dangle upon the jagged edge of a rocky precipice; to hang by your eyebrows upon the very brim of nothing, and live to tell of it, may seem wonderful, foolhardy or even insane, varying as one may view the act and its consequences, but all the thrill and all the excitement of cliff hanging may be indulged in by any average motorist possessed of steady nerves and a good eye for location and distance with front porch safety, in Colorado, the home of good roads, famous mountain drives and "safety-first" warnings.

I never have conversed with an easterner about mountain-touring who did not at once say something after this fashion: "But how can one drive over these roads safely when they are so full of dangerous places, until you gain a knowledge of them?"

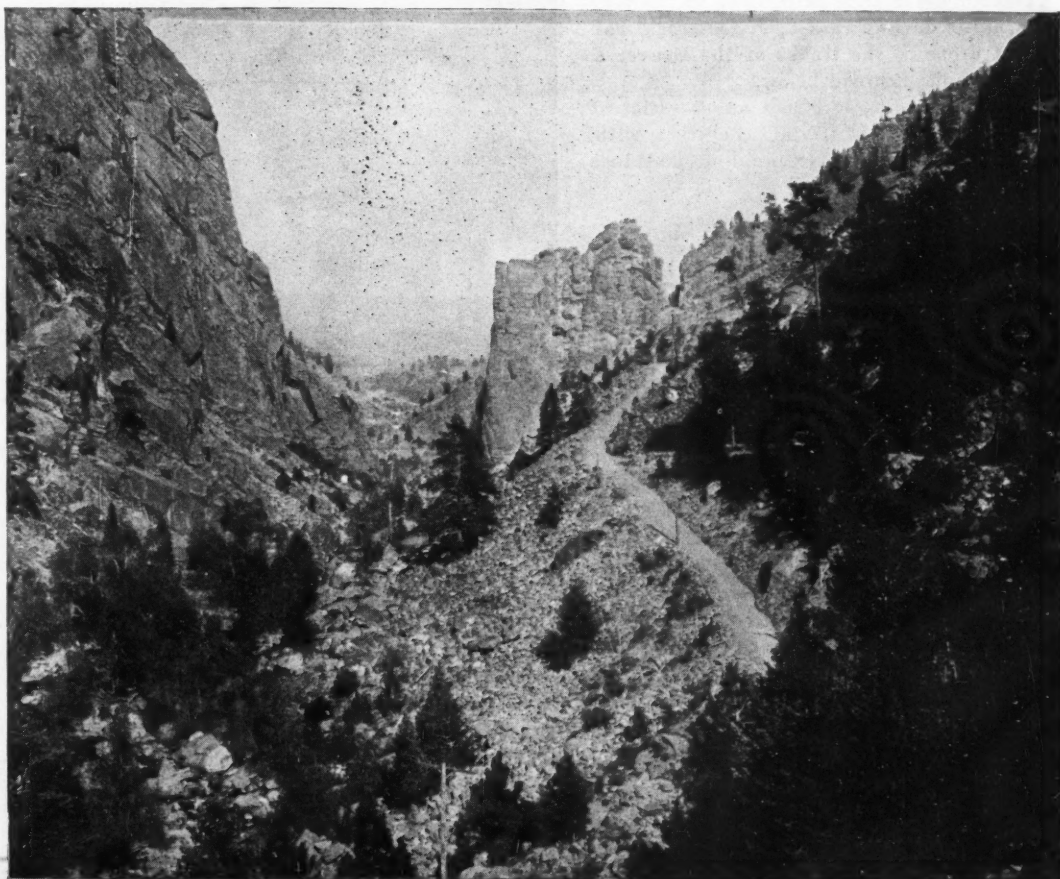
#### **Danger Imaginary**

I must confess to a certain feeling of fear and trembling the first time I took to a real steep grade, with a yawning abyss forcing its invitation upon me within a foot of my wheels; I think, however, that this feeling was brought on more by the remarks of motorists who had never made a mountain trip than by any sense of actual risk. The safety in driving a motor over the razorback trails of Colorado, Utah and Wyoming, leading over snow-capped mountains and on west to the coast lies principally in the excellent condition of the roads and in the sense of compulsory care and vigilance which you are certain to feel. Imagine driv-

ing downtown, say in Chicago or St. Louis, on perfect wood block streets, and suddenly sense your roadway winding up, up, until you leave the deep canyons of skyscrapers far below you and on a still perfect roadway continue your driving in absolute safety high above them. Such is the feeling I had when I stepped on my throttle on my first steep mountain climb.

You may say, if you have never mountaineered, that there is no such condition

as perfect safety when a mere stone on the roadway, or a sudden lurch of the car, might drop you down a hundred or perhaps a thousand feet on rocks painfully lacking in upholstery; to a degree you are right, but if you are the sort to waste your time worrying about the remotely possible eventualities of motoring you have no business at the wheel. Facing the danger element squarely, the safety margin is most elastic—the ordinary open road with its treacher-



*In Colorado Nature has built rock castles more beautiful and more fantastic than feudal lords ever conceived*



Where sunshine and shade play hide-and-seek

ous ditches and lurking broken culverts is essentially no different from the instantaneous sideswipe on a traffic crowded corner; a steering knuckle is just as apt to break with serious consequences at Wabash and Madison street in Chicago as at the top of the Royal Gorge—the master highway in Colorado, where the end of a perfect motor drive brings you to the very brink of destiny in a 2,500-foot rock wall that drops to the tracks of the Denver & Rio Grande railroad below.

Motoring danger is not an essential of locality; it is a driving condition with, of course, a spice of external circumstance over which you have no control.

#### To The Timorous One

If you are a good and careful driver at home; if you can take the traffic turns in your crowded districts with calm and deliberate foreplanning and ordinary hair-trigger decision, you will have no trouble guiding your car over the trails of the Rockies.

I drove a thousand miles through the Rockies into peak-shadowed canyons, out across pastoral meadow parks and mincingly edged along cliff roads upon my first motor venture into this great American vacationland. I toured in a car of ordinary power—a four-cylinder 40-horsepower car with 600 or 700 pounds of baggage in company with my wife and two small children. Leave the children behind because the hardships of touring and camping would be too great? Well, rather not; there is nothing that is better for them or surer to make for hardy physiques and buoyant spirits than a few weeks or months in a car on an overland trip. In addition to their own benefit, their irrepressible jollity and capacity for harmless mischief will be found a pleasant diversion after a long

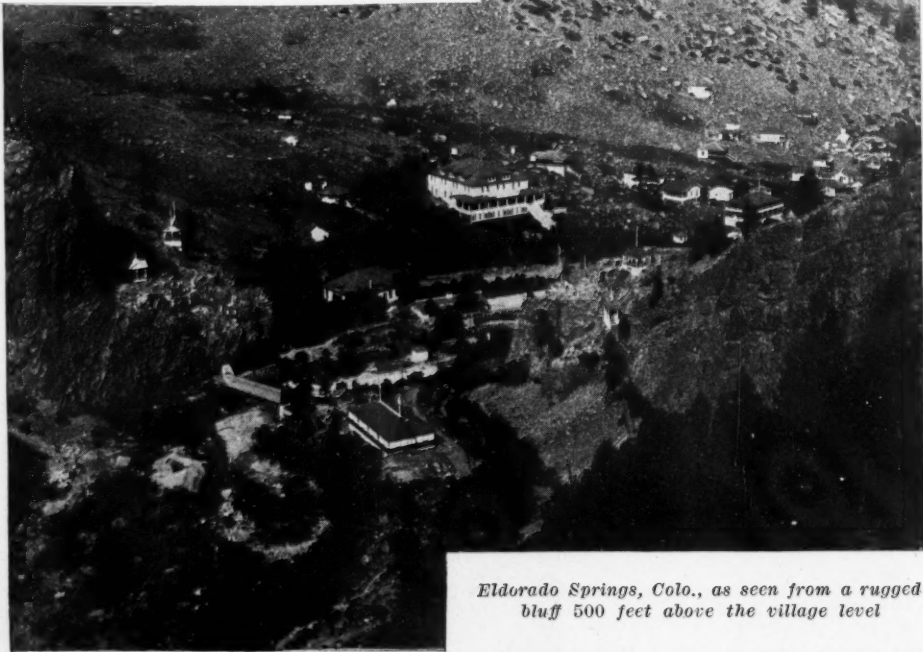
day's drive. With touring experience of many summers since our youngest was scarcely able to walk steadily alone, we have never regretted taking the pair with us, while countless opportunities for close companionship with the little rascals with a wealth of parental joy in their frolics and antics more than compensate for the trouble of taking them along and providing for their comfort.

"Oh, but you cannot camp with children!" Why not? They take far less room for sleeping quarters and are satisfied with less creature comforts than their elders, while the problem of feeding them is by no means as serious as it may seem. The grocery and general store of today are well provided with all the staples that are required to maintain a whole family in healthful provender and the baby by no means has been overlooked by the maker of ready-to-eat foods.

With your family comfortably placed in your car with all the needed conveniences to be found in a modern camping-touring outfit, you are on the sure road to touring happiness if you follow the trail to the steep slopes of the Rockies.

Where will you go? That depends en-

sense of proportion. The tourist would not want all prairie nor wish only for all mountains. Surely it was a wise Creator who placed the unending sweep of plains in such widespread audience before the mountains, casting up a vast amphitheatre where the nature lover may gaze in rapture at the vast stage beyond. It was an inspired Remington who first brought out the radiant beauty of the plains; their sunsets, their still more glorious sunrises and the sublime calm and rest of an evening on the open land. It was the prairies that held Remington spellbound for weeks and months when sketch and outline were made in feverish haste lest the beauty of the dawn or setting sun should be forever lost to him. Remington—what a pity that he has gone—brought the East its first close view in color of the rough and ready life of the cowboy and the life beyond the banks of the Platte and the Missouri. His brush and pencil yielded the only vision that is still held by countless thousands in the East of an empire that stretches for a



Eldorado Springs, Colo., as seen from a rugged bluff 500 feet above the village level

tirely upon your inclination. You can go almost anywhere in Colorado in a motor car, you really will find good roads in every direction into the mountains and any haphazard choice would bring you to the realms of wonderful scenery, fair to good roads and, with exceptions, within convenient reach of habitation. Colorado is divided into three general topographical divisions; the great plains and prairies which sweep so grandly, if monotonously, across Kansas and Nebraska, find their dissolution in eastern Colorado; next the Rocky mountains break the sky-line and finally the slopes drop to desert land as the western boundary is reached. The plains will hold many joys for the tourist if he has a proper

thousand miles over ever-rising knolls and billiard-table plateaus ending only when the knuckle-like peaks of the Rockies break the horizon as a sharp cloud against the hazy sky. If you would really know your America, if you would appropriate its charms and make them your very own—you can never claim it all no matter where else you have traveled into its many corners, until you have motored or wagon-trekked across the boundless plains. The plains with all their loneliness, with their unbroken distances stretching like eternity into space, there is a glory about them that can never be sensed when you are swept across the continent in a Pullman.

The plains are worth the time and patience it takes to cross them and there are



several good roads across Kansas and Nebraska, though naturally in the latter state the preference is the Lincoln highway. In crossing Kansas we found the Golden Belt Route an excellent approach to the mountains. With prairie dog towns on every side and ever-recurring sod houses the western section of the Golden Belt is all we may refer to in this article.

#### When a Knock Is Good

From Kansas City through Topeka, Manhattan and Salina and leaving Colby, Kansas on good dirt roads, good even in wet weather, if you only wait a day after heavy rains, you meander almost due west most of the time; many characterless villages and towns are swiftly passed through or detoured around—a burned connecting rod bearing laid us up late one afternoon at Goodland, when our desire was to head right on for the Colorado-Kansas line, only 18 miles ahead. Great shades of Pluvius! What a rain we missed on account of our inforced stopover. The knocking of our complaining connecting-rod, pounding its life out on the crankshaft, bit by bit, did not prevent us from hearing the distant rumbling of thunder, nor did the smell of a too-hot motor prevent us sensing that pre-rain ozone which so frequently foretells a deluging downpour. We had hardly unloaded before the excellent little Hotel Neu, with its well fed German innkeepers, before it came. Sheets, solid columns, at times it looked as though whole sections of the rain sieve had broken through and the skies were spilling their contents in one great enveloping cataclysmic washing. An hour of this and our

chances of going on to Colorado in the morning looked slim; very, very slim. One out here soon comes to know the power of higher altitude air, prairie sunshine and stiff breezes. Before 11 o'clock next morning, an hour or two before our car was ready to proceed, the roads were usable.

A traveler from 10 miles out said that while he had driven his horse through mud all the way, he was told by a neighbor over the telephone that the rain had stopped 11 miles west. By the time we covered the first few miles on low and second gears, the roads dried ahead and when we crossed the Colorado line at Kanorado, we were on dry soil again.

You notice how you can shake a hoodoo at times by crossing boundary lines. Well, we shook our rain hoodoo under the Colorado-Kansas boundary sign. Not a day had elapsed coming from St. Louis to Kanorado, excepting one, but that we had rain, copious rain. Here we shook it off and how thankful we were for the change.

The next 80 miles passed without change of scenery until within 10 miles of Limon, best remembered by us because we pitched our tent in a deserted farmyard, only to find later that we had evidently pre-empted a skunk. I will pause here to say that we have always made it a custom to camp within a mile or two of some village or town because occasionally a quick trip may be made to a nearby village for supplies overlooked or forgotten. Then, too, there is the added advantage of being near to medical or surgical aid, which bears reckoning with. However, our own well-prepared and well-filled first-aid chest con-

tains all the essentials for emergency use.

Leaving Limon you climb up and up until you wonder if the upgrade ever will have an end. Here you begin to appreciate the wonders of the modern motor. If you have ever mountaineered afoot you, no doubt, puffed and gasped as you struggled into higher altitudes, at times you perhaps felt like lying right down in your tracks and giving up the ghost. There is no feeling among all the senses of exhaustion that quite equals the feeling of utter goneness which comes from altitude fatigue.

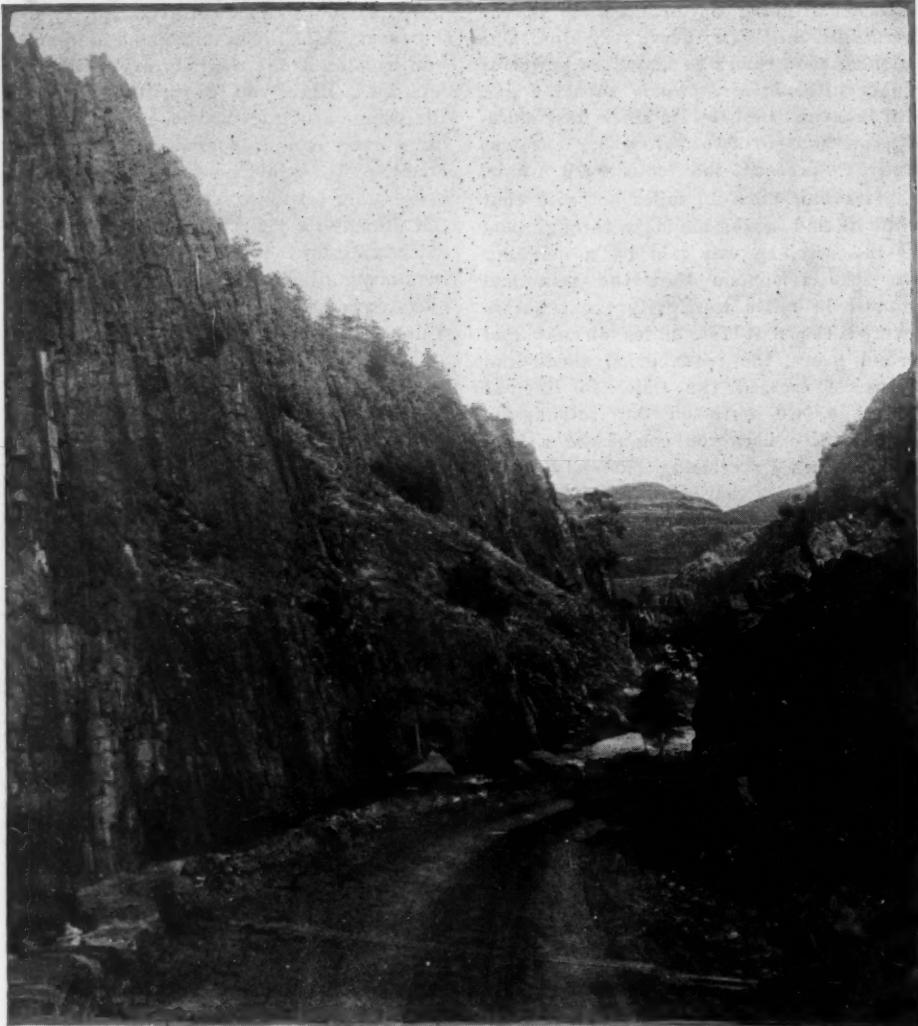
Take the size of your lungs, the fact that the average human lung asks for only 575 cubic inches per minute, compare that with the vast consumption of air demanded by your modern high-speed motor, with a displacement, or evacuation, by piston motion in the cylinder of about 88 cubic inches with each turnover and with your motor traveling at the rate of 1,200 revolutions per minute when you are gliding along at 20 miles per hour, then you are asking the motor to take in 105,600 cubic inches of fresh air every minute and exhaust that much discharged and burnt gas. Disturb the balance of the usual operation by changing the thinness of the air and imagine what happens.

#### Altitude Makes Motor Sick

Mountain or high-altitude air is thinner than lower air and your carbureter may not be able instantly to adapt itself to the changed conditions and your motor will get sick. Maybe it will get very sick. Mine got so deathly sick that I thought it would never get well. Of all the aggravating causes for delay I give the palm to a balky



*A town nestling in the shadow of snow-capped peaks*



*Where you bid goodbye to the Estes Park roadway*

engine. It may be that Providence put the balk in the motor so some clever man could work out a motor that would not choke nor sicken; now and then you'll hear tourists tell about not having even so much as one minute's trouble when they get into the mountain air, but garage men and repair men tell a different story. I think that all of the cussedness my motor ever stored away for future use was loosed on the high plains approaching the mountains. I suppose if I had not fooled with the carbureter adjustments when I started having trouble, I might have had less of it, and then again I might still be there sitting out on the plains with 40 horsepower, unable to use it because somewhere inside the vitals of that motor a nerve was unstrung or a muscle wouldn't work or something or other.

#### **Mountain Motor Adjustment**

Praise be that in my experience in nursing an old motor car back to life I had stumbled on some trifling carbureter adjusting and once I got started I worked the adjustments both ways from the middle, from low C to high C and back. I opened the air valve till I fairly choked her up with prairie wind; then I shut down until it must have taken a pull to get any through at all; I did the same with the

gas feed and, as much to our surprise as to the motor's, we finally got it going and once it got its wind, the high altitude went to its head and the effect was probably like that on some humans—it didn't have good sense for some time. At any rate the way old Pegasus took to mountains and made them look like mole-hills was sure a sight worth seeing.

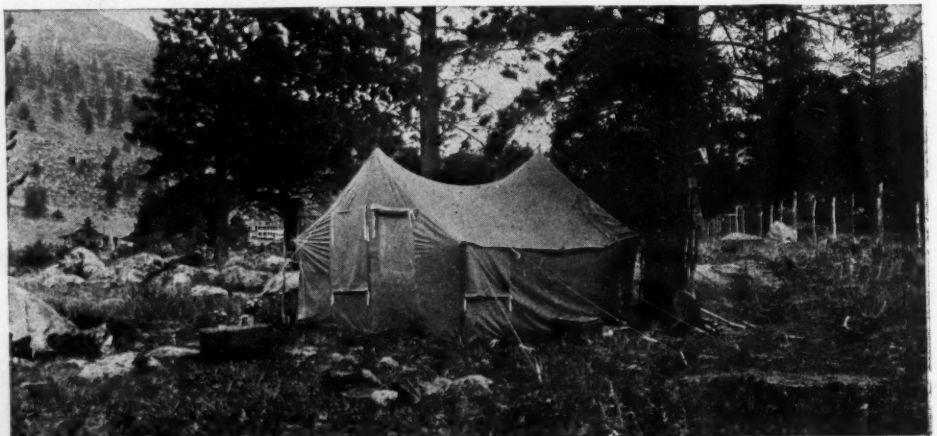
Before I leave the subject of carbureter adjustments for higher altitudes take note that the gradual rise in altitude is at first

unnoticeable until you get into western Kansas or Nebraska. The actual rise is about 1,600 feet to 100 miles and this increases until the broad plateaus of eastern Colorado or Wyoming are reached. Here in sight of the distant ranges the plains flatten out again and as though having fulfilled their duty in bringing you near the snow-capped peaks you are left free to travel on practically level rolling prairie land until you begin the steep ascent of any one of the majestic trails that lead up into the mountains and across the numerous passes, which for hundreds of years have let man venture from plains to mountain fastness and from thence to desert-lands beyond, and if life and strength and ambition still called across other ranges out on to the open plains that front the Pacific ocean.

#### **Reserve Power Necessary**

Nowhere do you need your reserve power more than in the mountains and nowhere does the pride of ample power mean more to you than here. When you climb, climb as for instance on the wonderful drive up Lookout mountain, where Denver has created a marvelous scenic drive, you are heartily thankful for the willingness and response of a strong motor. What a load it is for a horse, especially an overworked tourist horse, to take even its own weight up a mountain. I do not reckon the iniquitous burro as a real animal of burden; he is a pest to a man of the speedy 20th century. He is worse than foot-back.

Barring a few good burros that the guides seem to get for themselves, there are none that lessen the ultimate strain and work of mountain climbing; it's more work making a burro work than it is to do your own walking. That is my opinion and though others may differ with me, I stand by it, but your motor; there may be times when a motor balks on you; there may be times when you think it would be harder falling over a cliff from a cushion seat than from the so-called sure-footed burro's back, but there's nothing in that. With the wheel in a capable driver's hand, one who does not give way to alarm or fright, mountain driving is safe and above all things it must be sane. Take the beau-



*Where we camped for the night at the foot of a mountain*



tiful 22-mile drive from Loveland through the canyon of the Thompson river into Estes Park. There is something truly glorious about the majestic drive through Thompson canyon to Estes Park; if you have ever driven it yourself, you will want to take it again as a passenger in one of the splendid Stanley steamers which make daily trips from Loveland and Lyons, with passengers and baggage. If you have made the motor stage trip as a passenger and have not driven it in your own car, then you should by all means motor through this marvelous 22 miles of delight.

There are few roads anywhere in the mountains that have had such excellent care as the road through the canyon—every mile of it gives evidence of good building and up-keep. There is not a bad stretch on it. There are sharp turns because the Thompson river rushes down an angular course, but these turns are well defined and the road banked away from the edge and not infrequently rock walls several feet high have been built along the edge to help safeguard the traveler. I say help because there are many danger signs and warnings and of these perhaps the most conspicuous are the state traffic warnings which read something after this fashion:

**STOP! DANGER!!**

If you value your life, use discretion. Do not go faster than 6 miles per hour and sound horn constantly.

When a sign like that faces you, judgment and safety rules are pretty apt to be called into use; the driver who does not heed the mountain road signs is a fool and not to be trusted with a motor car. There are many such signs, not only in Thompson canyon but along many of the beautiful, if thrilling, drives in Colorado mountains.

Winding through the canyon in leisurely fashion, taking your time at beauty spots along the way, the eye and heart find much to delight in. For the lover of trees there is no more delightful spot in all America than this pine region; every Rocky Mountain species of pine and cedar may be found on the rocky slopes which rise abruptly from the road side to dizzy heights.

Flowers grow in bewildering profusion in these frosty regions. Surely the Allwise Creator intended the riotous colors and fragrance of His mountain flowers as a reward to those who would brave the discomforts of mountain travel to gaze in rapture upon the wild-flower fields in the shadows of snow-capped mountains. Covered under a mantle of snow that sometimes reaches a depth of 20 feet or more; frozen by some 7 months of frosty weather; dared to life's struggle by the bitter winds of the long winter, these tiny messengers of hope spring up in early summer and cover the slopes and valleys with their soft carpet of color, the like of which is not to be found anywhere in the world unless it be in the now forbidden Alps.

Anyone traveling by motor, afoot or horseback over these mountain trails now



*These clouds are farther away than they look*

must stop and wonder at the foolhardy audacity of these army divisions in Europe that are driving their artillery, not to mention their cavalry and infantry up the steep and forbidding cliffs of mountains as precipitous as the Rockies. On every hand in Thompson canyon you will find the floral delights of our land; purple thistles raise their pretty heads with an invitation to the passerby to brave their vicious spikes; gorgeous cactus blooms add their red and yellow tints; Indian pinks, purple astors, delicate primroses of a dozen hues, the mariposa lily blooms in a solid, consistent lavender, tiger lilies in richest tones, snow stars, woodbine and pale green clematis and everywhere in beauteous variety of tints, the columbine, the state flower of Colorado. Countless varieties of small flowers of other kinds add to the confusion of color. On one occasion we gathered over thirty separate and distinct colored blossoms of one species. Farther up in the valleys that lay in the darkening shadow of Long's Peak you will find, in season, perfumed orchids and roses, while in the hollows and on the hillside the gentian may be found after the snow has melted and gone down the mountain streams.

The motorist may hurry along and traverse the 20 odd miles through the canyon

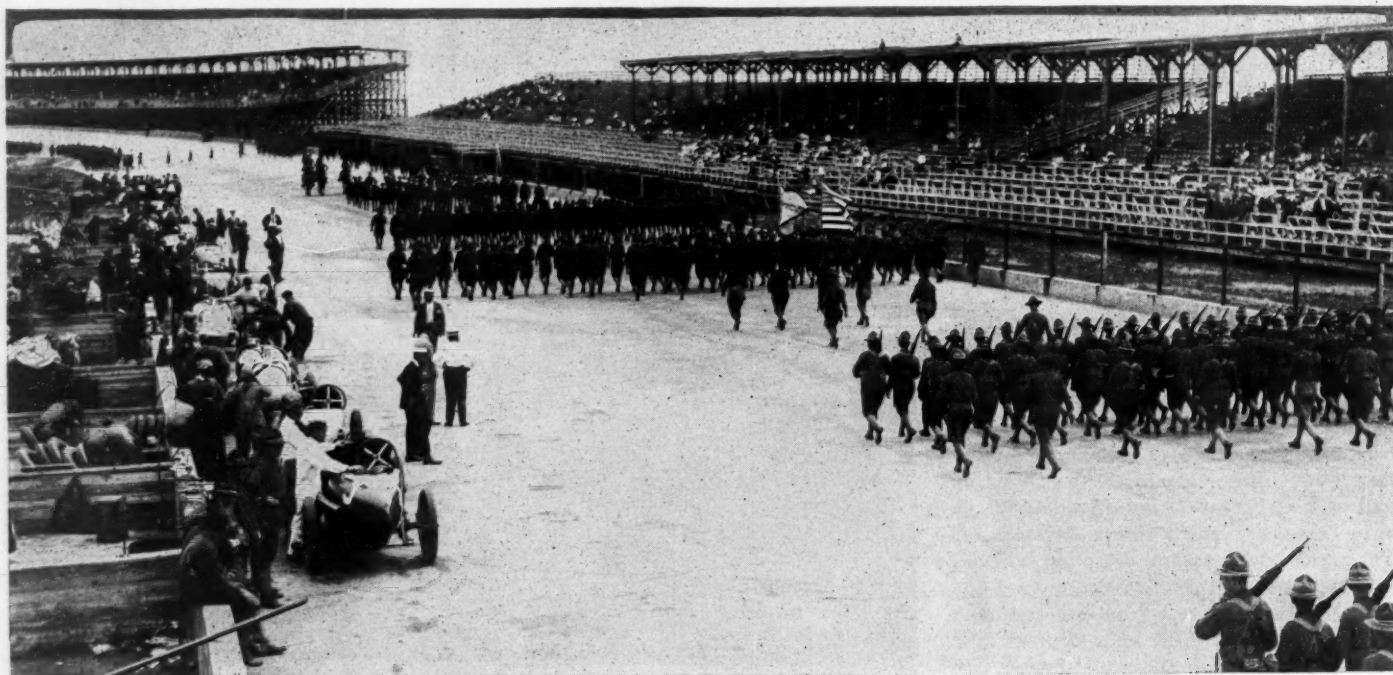
in a couple of hours, or he may do as we did, dawdle along and study the life of the Rockies at first hand. There is plenty to interest one at every step of the way. With the dashing Thompson river at your side always, sometimes spraying you with mist as some unusually bold whirlpool breaks over a rock, sometimes far enough away from you so that you hear only the singing laughter of the rapids as they pass the crystal stream along, always you ride along in sight or hearing of this beautiful stream and cross it time and again on your way up the steep canyon.

There are many single-file portions of the road, places where you will do well to follow the warning of the road signs to the very letter and then some; in such places there is no danger for the careful driver, but a foolish pilot could get into considerable trouble and bodily danger.

(To be concluded)

## NEXT WEEK

"What the Car Factory's Service Department Means to the Car Owner." : : : :



Minnesota state troops inspected by Governor Burquist as curtain-raiser for Twin City Independence day event

## De Palma Star of Curtailed Twin-City Meet

Mercedes First in 150-Mile Race at 91 Miles Per Hour—  
Aitken's Peugeot Second

MINNEAPOLIS, Minn., July 4—Ralph de Palma, at the wheel of his cream-colored Mercedes was the bright particular star today of the sadly curtailed Mid-Continent races at the Twin-City speedway. The veteran Italian toolled his hyphenated German-American mount into first place early in the 150-mile event and held that position for a win. His time was 1 hour 38 minutes and 49.20 seconds, an average of 91.08 miles per hour.

Aitken in the Peugeot put up an exciting battle but finished second, 1 minute and 25 seconds behind de Palma, his time being 1:40:14.05 or 89.7 m.p.h. Christiaens, whose English Sunbeam led de Palma for

the first 8 miles and again from the twelfth to the fortieth mileposts, and menaced de Palma's supremacy for 65 miles, took third in 1:43:28.75 or 87 m.p.h., 2 minutes behind Aitken and over 5 behind de Palma.

The remaining five cars of the seven to finish in the money were:

Milton, Duesenberg, fourth; time, 1:44:11.95 or 86.5 m.p.h.

O'Donnell, Hoskins Special, a Duesenberg machine, fifth; time, 1:47:37.95 or 83.6 m.p.h.

Sorenson, Marso, a Duesenberg, sixth; time, 1:56:14.45 or 77 m.p.h.

Muller in Dans L'Argent, a special job

with a Hudson motor, seventh; time, 2:01:18.20 or 74.7 m.p.h.

The last car to finish just barely lived up to its name, for Dans L'Argent means "in the money."

### Trouble Over Prizes

Until almost 4 o'clock prospects of any race at all were dubious indeed—not that there were not starters enough, for fourteen cars were ready for the signal; not that the track was any worse than normal, for while there were clouds and showers in the morning the sky was clear and the sun was shining by 11 o'clock—but because the promised \$20,000 supposed to be hung up as prize money for the four events of the day was not forthcoming.

The program scheduled four races, 150 miles, 50 miles, 20 miles and 10 miles respectively, with the big event of 150 miles to start at 2 o'clock. But at that hour the grandstands and parking spaces were disappointingly bare. The expected crowd had failed to materialize, due to the morning's rain and to lack of proper advertising of the races. The speedway management had counted on the gate receipts to provide the funds for the prize money, and seemingly the total of the advance sales and the gate receipts did not amount to much more than \$8,000 of the \$20,000 announced prizes.

W. C. Barnes, A. A. A. representative, refused to permit the race to start until the prize money had been placed in his hands as required by the rules of the association. The sparsely settled grandstands were becoming impatient by 3 o'clock when



De Palma, Christiaens and Rickenbacher turned lap after lap in the order named



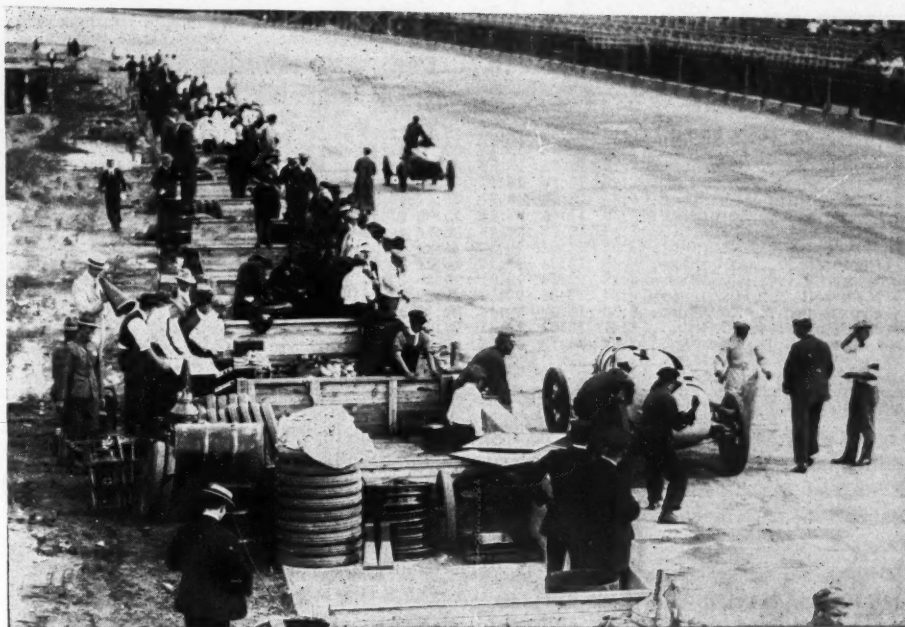
Barnes called a meeting of the drivers. These first offered to stage a 10-mile exhibition for no prize if the manager would return their money to the ticket holders. This not being received with enthusiasm by the management, it was decided to run the 150-mile event, only, for the \$8,000 cash and Manager Sperry's check for the balance secured by speedway stock. Starter A. C. Bennett then sent the fourteen cars away at 3:55, nearly 2 hours late.

The afternoon's events began with a review of the state troops by Governor Burnquist and this also may add to the difficulties of the speedway management for the contract with the state for the exhibition of the militia calls for a payment of 10 per cent of the gross receipts to the soldiers' fund. Now the state threatens suit.

#### Fight for Lead

Fourteen cars rolled across the tape for the start. Chevrolet had the pole, and his neighbors were Aiken, de Palma and Christiaens. In the second battalion were Rickenbacher, O'Donnell, Anderson and Galvin. The third row included Milton, Buzane, Henderson, Ostewig, and Sorenson and Muller brought up the rear. Cooper broke a piston rod in the trials and did not start.

The real fight for first money was between the first four until Chevrolet dropped



Rickenbacher makes fast tire change on Maxwell

was third at the end of 2 miles, finished second.

Milton, a local celebrity, gathered in fourth money and made a good run. O'Donnell was fifth, Sorenson, local entrant, was

the wire together. De Palma led in the sixth lap. Up to the eighteenth Christiaens led by a good margin. Then de Palma took the lead. Rickenbacher, who ran third after the second lap, had worked up to second place by steady driving, and in the twenty-sixth lap jumped to the lead. This was notwithstanding a blowout as Rickenbacher rounded the first quarter in the twentieth mile.

#### De Palma Heads Field

De Palma resumed the lead in the thirtieth lap, after a record of 93.30 miles average for the first 60 miles. Aitken made his way to the head in the thirty-eighth and held for the next 6 miles, when he was nosed out by de Palma. Christiaens jumped back to the lead for two laps and then Rickenbacher took the van for 22 miles. The lead was then a see-saw between Aitken and de Palma, Aitken stopping at the pits in the sixty-ninth lap for tires.

Milton ran along about tenth place until he had covered nearly 50 miles, when he began to spurt up to third place. He ran steadily third and fourth until he had

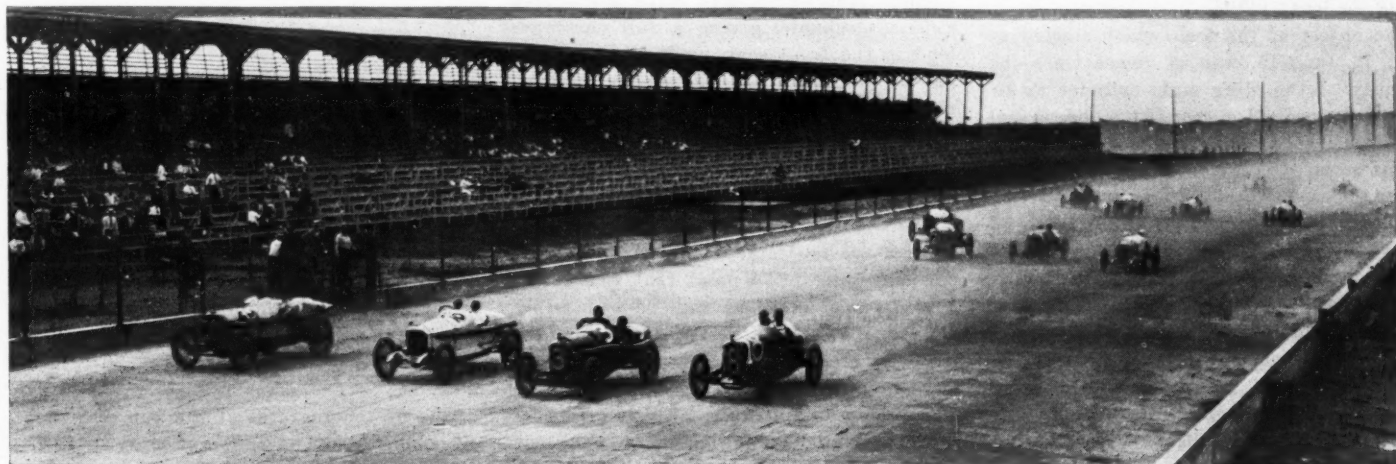
#### EQUIPMENT OF CONTENDERS

CAR	DRIVER	CARBURETER	SPARK PLUGS	OIL
Mercedes	De Palma	Mercedes	Eisemann	Monogram
Peugeot	Aiken	Miller	K. L. G.	Oilzum
Sunbeam	Christiaens	Miller	K. L. G.	Mixture
Duesenberg	Milton	Zenith	Rajah	Oilzum
Marso	Sorenson	Schebler	Rajah	Oilzum
Hoskins Spl.	O'Donnell	Miller	K. L. G.	Oilzum
Dans L'Argent	Muller	Hudson	Rajah	Castor
Maxwell	Rickenbacher	Miller	K. L. G.	Oilzum
Frontenac	Chevrolet	Zenith	Rajah	Castor

NOTE.—All cars had Silvertown cord tires; all had Bosch ignition except Dans L'Argent, which had Delco; all had Hartford shock absorbers except De Palma, who had Mercedes. All drivers used Boyce Moto-Meters except Milton, O'Donnell and Muller; all used R-W wire wheels.

out with a broken rocker arm at the end of the fifty-second mile. Christiaens, who led at the start, finished third. De Palma, who started second, ended first. Aitken, who

sixth and Muller seventh. Christiaens made a good race with de Palma. They were neck and neck at the end of the third lap and at the end of 10 miles crossed



Off on the preliminary lap for the flying start of the 150-mile race on the concrete speedway at the Twin Cities

## TIME OF ALL CARS EACH 10 MILES OF THE 150-MILE RACE AT TWIN CITY SPEEDWAY JULY 4, 1916

No. Car	Driver	10	20	30	40	50	60	70	80	90	100	110	120	130	140	150	M.P.H.
10	Mercedes ...DePalma...	6:12	12:32	19:00	25:27	32:05	38:36	45:22	52:03	59:30	1:05:52	1:12:24	1:18:58	1:25:32	1:32:12	1:38:49.20	91.08
2	Peugeot .....Aitken....	6:22	12:48	19:18	27:08	33:45	40:21	46:52	53:23	59:54	1:06:25	1:12:57	1:19:28	1:26:00	1:32:31	1:39:02	89.7
20	Sunbeam ....Ch'stiaens	6:12	12:31	18:59	25:30	32:20	39:22	46:50	53:03	59:52	1:06:40	1:13:27	1:20:14	1:27:01	1:33:48	1:40:35	87.0
7	Duesenberg ..Milton....	6:49	13:15	19:47	26:22	33:08	40:35	46:45	53:25	59:54	1:06:39	1:14:55	1:24:14	1:30:52	1:37:32	1:44:11.95	86.5
1	Hoskins Spl..O'Donnell.	6:24	12:56	19:27	26:17	40:03	46:44	53:27	59:54	1:06:35	1:15:22	1:20:08	1:27:03	1:34:09	1:40:56	1:47:37.95	83.6
30	Marso .....Sorenson..	8:29	17:44	25:49	29:05	41:56	49:50	57:28	1:05:25	1:13:01	1:20:06	1:27:32	1:34:52	1:42:01	1:49:09	1:56:14.45	77.6
25	D. L'Argent..Muller....	7:57	16:03	24:11	32:16	40:13	48:18	56:00	1:03:51	1:11:40	1:19:40	1:27:48	1:36:13	1:44:35	1:53:02	2:01:18.20	74.7
26	Duesenberg ..Buzane...	6:32	13:02	19:33	28:21	35:09	40:32	47:14	56:34	1:03:11	1:09:46	1:16:18	1:28:48	1:38:23	2:02:14	Flagged	
2	Premier .....Anderson	6:35	13:04	19:34	26:07	32:41	40:40	47:04	53:30	59:59	1:08:38	1:15:18	1:21:52	1:29:37	Out		
12	Maxwell .....Rick'b'ch'r	6:13	12:34	19:01	25:30	33:23	39:04	46:45	53:22	59:53	1:06:21	1:12:53	Out				
4	Maxwell .....Henderson	6:54	13:31	20:12	25:39	32:29	48:18	1:01:30	1:17:48	1:28:08	1:38:28	1:45:23	Flagged				
18	Frontenac ...Chevrolet.	6:23	12:49	19:18	25:46	32:13	Out										
17	Sunbeam ....Galvin....	6:31	13:01	19:32	26:05	Out											
9	Ostewig Spl..Ostewig...	7:03	14:10	31:53	Out												

tire trouble in the fifty-third round. After 10 miles he dropped out again. For 6 miles he had a neck-and-neck brush with de Palma who, however, had laps the advantage.

Rickenbacher dropped out at the end of 116 miles, leaving the fast field to de Palma, Aitken and Christiaens. Ostewig withdrew at the end of 30 miles, Galvin at the end of 42 miles. Henderson had 118 miles to his credit when the flag fell and Buzane ran only 138 miles when he was flagged off.

De Palma stopped only once, for two tires. Aitken stopped three times for tires. Christiaens stopped three times for tires.

O'Donnell and Sorenson each made only one stop and Muller's Dans L'Argent went through without a halt at the pits, the only car to do so. There was little mechanical trouble, but what there was proved to be sufficient to cause withdrawal in a race so short as this.

There was some record pitwork in the

race. Aitken, during his drive to catch de Palma, changed one tire in 15 seconds, according to the report of the A. A. A. technical committee. Anderson changed one in 17 seconds. Christiaens and Rickenbacher also made very rapid changes.

The 2-mile cement track is just as rough as it was last year, seemingly little attempt having been made to improve it. Aside from the financial situation and flagrant laxness of the city police near the end of the race by which spectators were allowed to flock across the track when cars were still running, the race was well handled. Scoring and timing were particularly efficient and after the first 30 miles the scoreboards were up to the minute.

#### Causes of Withdrawals

Chevrolet, Frontenac, broken rocker arm. Rickenbacher, Maxwell, broken oil pump.

Anderson, Premier, broken rod.

Galvin, Sunbeam, broken magneto coupling.

Ostewig, Ostewig, slipping clutch.

be a strictly stock job throughout, even including the details of equipment. This is a Model E car with an eight-cylinder 3 by 5 motor, having an N. A. C. C. rating of 28.8 horsepower and a piston displacement of 282.7 cubic inches. The motor is a product of the King plant and follows conventional eight-cylinder practice with the cylinders cast in blocks of four at 45 degrees. The valves are on the inside of the V and are operated from a chain-driven camshaft. Cooling circulation is by thermo-syphon, lubrication is by pressure and ignition by single Atwater Kent battery system.

Gasoline is fed to a Ball carburetor by the Carter system instead of the one noted last week. Starting and lighting is by Ward-Leonard. The drive is taken through a plate clutch, through a three-speed unit plant gearset, through a floating American rear axle. The gear ratio used on the test car was a standard 4.25 to 1 and the tires 34 by 4 Firestone plain tread front and non-skid rear. The only fitting on the car which does not coincide with stock practice was an additional speedometer.

During the course of the run the car made 160 stops. On sixty-nine of these, changes of either driver or mechanic were made. Besides stops for supplies and changes of drivers, the other causes for stops were as follows: Testing electrolyte of battery on several occasions, replacing bulbs, oiling universals, oiling speedometer drive, tightening grease cups, tightening fan belt, cleaning gas line, taping leak in gas pipe, tire changes, renewing motor oil, splicing horn wire terminal, steering gear adjustment, and at important distances, such as 10,000 miles, the car was stopped for photographs. Throughout the run no adjustments or mechanical work was done that could not be accomplished by the ordinary owner, this being one of the objects of the test. The weather conditions were very severe during many parts of the run. In one instance the fog was so thick that the driver could hardly stay on the track.

#### Oil Economy Feature

One of the features of the run was the oil economy. The car averaged 1,172.7 miles to a gallon of oil, in spite of the speed.

## King Eight Completes Non-Stop Run Does 11,000 Miles in 2 Weeks

**S**HEEPSHEAD BAY, N. Y., June 29—Just a little after noon today the King eight-cylinder car, which has been undergoing a non-motor stop test for the last 2 weeks, rolled across the finishing line of the board track here, having covered practically 11,000 miles without a falter in its powerplant.

The object of the test, which started at noon on June 15, was to demonstrate the stability of the King eight-cylinder motor and to approach a condition of actual service by concentrating the running and operation of 2 years' car service into 2 weeks of test work. To accomplish this the car maintained an average of over 32 miles an hour, including the stops to take on gasoline, oil and other supplies. Excluding the stops the speed was 34.31 miles per hour. The engine ran 24 hours a day and was not stopped from the moment the test started until it was switched off by F. E. Edwards, technical representative of the A. A. A., before the New York King salesroom late this afternoon.

The test was methodically arranged and

carried out from start to finish. It was under direct sanction and supervision of A. A. A. officials, who worked in shifts of 8 hours, observing the running of the car and noting on the score sheet the time of each lap around the 2-mile track. The drivers worked in shifts of 5 hours with a 10-hour rest period and with the driver rode a mechanic, giving a full passenger load in the front seat, while in the rear a bag of sand weighing 500 pounds was carried to represent the full passenger load in the tonneau.

The entire 10,850 miles was run on the speedway except 200 miles which were made on the roads of Long Island.

As a service test of the car the King company makes the point that this shows actual performance as well as it possibly can be shown in a test because the distance covered by the car is equal to about 2 years of normal driving and the speed is not very far in excess of that often demanded by the car owner. The King car which made the test was certified by the King company and by A. A. A. officials to



## Race Dates in Muddle

### Grand Prize and Arizona Fair Events Dovetail and Cry Is Heard

#### Copper State Meet May Be Postponed and Possibly Cancelled

PHOENIX, Ariz., July 3—Granting of November 18, unofficially reserved by the Arizona State Fair Commission before the contest board of the American Automobile Association for the annual Arizona fair races, to Santa Monica, Cal., for the grand prize in the coast city, has muddled the dates of the local show and threatens to cause cancellation of the Arizona races. Lengthening the fair week by 2 days, however, has been set on as the expedient whereby difficulties may be obviated, and the plan now is being considered by the commission.

The big event for the Arizona oval this year is the 250-mile speedway contest for all classes. It is expected that most of the leading drivers, many of whom will be in the West at that time, will be entered in the Phoenix classic. Already pledges have been received from Oldfield, Resta and several others of their class.

It is felt here that California and the Pacific coast have hogged the dates and races for the coming fall season of racing. Both the grand prize and Vanderbilt events are staged for dates which conflict with the Arizona dates, even if it be set for Monday, November 20.

#### CINCINNATI ENTRY BLANKS OUT

Cincinnati, July 1—Entry blanks for the \$30,000 sweepstakes race to be run at the new Cincinnati speedway on Labor day, September 4, have been sent out by the Cincinnati Speedway Co. This race is one of the A. A. A. 1916 championship award events and sanction has been granted by the association. Ten place prizes are offered, the first prize being \$12,000. Five hundred dollars also is offered for the leading car at each of the following distances: 100 miles, 200 miles and 250 miles. The race is for 300 miles and is open to 300-cubic-inch cars. Entries close midnight August 26.

#### SIoux CITY RACE POSTPONED

Sioux City, Ia., July 4—A hammering three-hour downpour which visited this locality early this morning converted the local gumbo speedway into a sticky, pasty mass of mud and made necessary postponement of the speed carnival scheduled for today, until Saturday, July 8.

First announcement of the postponement came through local newspapers before the A. A. A. officials or drivers had been consulted, resulting in no little amount of strife among the drivers, many of whom desired to stage the meet tomorrow, inas-

much as their cars are entered for the Omaha race July 15. The newspaper announcements, however, carried word to the people that the race would not take place until Saturday, and the disgruntled drivers were obliged to overlook the blunder, knowing that the gate receipts would not make a race tomorrow worth while.

The method of dividing the prize money with the winners in accordance with the amount of the gate receipts has not been welcomed warmly and a majority of the drivers stated that they would refuse to appear at another race without a stipulated guarantee of prize money. Ralph Mulford, who was one of the big drawing cards of the race, shipped his car this afternoon for Grand Rapids, Mich., where he is entered in the July 8 race meet.

#### OMAHA HAS TEN ENTRIES

Omaha, Neb., July 5.—With the speedway races here but 10 days away, interest in the big contest is being augmented daily by announcements of the names of additional drivers who compete in the classic.

The list already includes the names of ten of the foremost drivers, and enough more are expected to sign to bring the total up to a full score. The drivers thus far signed, with the cars they will drive, are as follows: Resta, Peugeot; De Palma, Mercedes; Rickenbacher, Maxwell; Cooper, Stutz; Mulford, Vail, Hudson Super-Six; D'Alene, Milton, and Devlin or O'Donnell, Duesenberg; Thompson, Olson Special.

Mulford will drive the only stock car to be seen in the races here, and Devlin or O'Donnell will pilot the big sixteen-valve Duesenberg, which won fourth place at both Chicago and New York this year.

A great deal of disappointment was experienced in the races held last year, due to the fact that the schedule was such as obliged several of the drivers to endeavor to bring their machines to Omaha and race within a day or two after they had been put out of commission in contests in Sioux City. As a result, but seven drivers appeared, the number being further reduced by conflicting dates at other races over the country.

This year, however, Omaha's date is the only one between July 4 and August 7, giving ample time for drivers to get their cars into shape again after driving at Sioux City or Minneapolis, and plenty of time thereafter to go to Tacoma, where several of them are billed.

#### AFTER CHICAGO-NEW YORK RECORD

Chicago, July 5—Starting from the Del Prado hotel at 12:01 a. m. tomorrow, a Standard eight, with Clarence R. Schuyler, New York manager of the Standard; Floyd Huff, Newark, N. J., agent, and Roy Lasher as drivers, and Robert W. Sykes, a Brooklyn newspaperman as observer and checker, will attempt to break the present record from here to New York. The New York control will be Sixty-third and Broadway.

## Begin High-Gear Test

### Pathfinder Twelve in Transcontinental Trip with Only Two Gears

#### Will Follow El Camino Real and Lincoln Highway

SAN DIEGO, Cal., July 2—Special telegram—Walter Wiedley and Heinie Scoller, both of Indianapolis, started at noon today on a high-gear transcontinental run in a Pathfinder twelve touring car.

The start was made from the Plaza de Panama, Panama-California International Exposition. The finish is to be New York city. The route is over the famous El Camino Real to San Francisco, thence via the Lincoln highway across the continent.

Before the start, the gearset was opened and an official of the contest board of the A. A. A. sealed the case after finding only the high and reverse gears inside. These seals will be carried intact to New York where Chairman Richard Kennerdell, of the contest board, will take charge of the car.

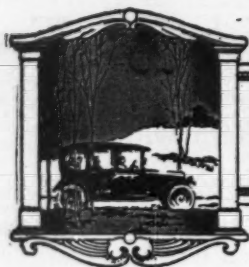
The car was started by an electric button pressed by L. M. Maynard from the seat of the famous Old Pathfinder, "Lena," at Denver, Colo., at 12 o'clock, Pacific time. The connection was cut in on the Western Union circuit and when Maynard pressed the button it started the motor. The car is to be registered with the A. A. A. as a stock model.

Silvertown Cord tires, Pyrene, Boyce MotoMeter, and Pull-You-Out, all rest stock equipment.

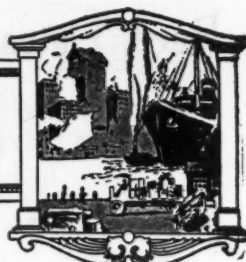
#### NEW YORKERS PLAN HILL CLIMB

Utica, N. Y., July 1—The Automobile Club of Utica, Utica, N. Y., has issued entry blanks for a hill climb to be held on College hill, Oriskany Falls, N. Y., July 22, 1916. Sanction has been awarded by the American Automobile Association. College hill is a 1-mile climb having an average of 7½ per cent, a maximum grade of 14 per cent and a minimum grade of 3 per cent. There are five events scheduled, four of them in class C non-stock. The first one is open to cars having displacement between 161-230 cubic inches, the next is under 300 and over 231, the next 301 to 450, and the next 451 to 600. The fifth event is a non-stock free-for-all. Prizes are silver cups. Entries close July 17.

Special events are planned for the hill climb, one of them being a truck contest open to trucks of 2 to 5 tons capacity, each one to be loaded to capacity. The trucks will run against time from Oriskany Falls to Knoxboro and return and finish by going up the hill. Another event is a women's contest in which the conditions are the same as the regular hill climb under A. A. A. sanction, except that a flying start will be allowed.



## EDITORIAL PERSPECTIVES



### Danger on Good Roads

**S**AFETY on highways ought to receive more attention. Speed fiends and drunken drivers already are attended to by laws, but there are many very real dangers which have received no attention. One of these is the road intersection where thick shrubbery or trees make it impossible for the driver on one street to see an approaching vehicle on the other until the two are ready to collide. Slow driving is of little avail in such places; the only remedy is to clear away the obstructions to sight, as is required by regulation in some places. Another danger spot is the narrow road with sharp curves where it is impossible to see ahead on account of shrubs and trees. Motor cars have considerable trouble at times when they meet on such curves, but the danger to them is by no means so great as it is to the young man who is holding his best girl in a buggy and

neglecting his horse. Such an obstruction in the center of a narrow winding road is not quickly guided to the side where it belongs. Underbrush ought to be cleared away on the inner side of such curves, at least so that a driver can detect another vehicle on the road ahead before it is nearer than 75 feet. This does not require the destruction of shrubbery or trees, but merely enough thinning out of the growth to enable a carriage or motor car to be seen. Still another danger point is the junction of a road with another at right angles, concealed by an intervening rise or curve so that the junction point is not seen until just before the moment when the driver on the joining road must turn into the main road. Such places are extremely dangerous and sign posts should be erected to warn the traveler of their proximity. This precaution would eliminate many accidents.

### Plan Highway Improvement

**C**ONNECTED systems of roads have been selected as main highways by local road associations in many parts of the country, and each association has given its pet project a name and is urging its improvement. The influence of such organizations is often strong, the roads are carefully selected, and sometimes an engineer is engaged to co-operate with the local authorities in planning the improvement. Naturally, the association urges the authorities to undertake all the work that these enthusiasts consider necessary to place the route in excellent condition. On the other hand, the local authorities must provide schools and care for the sick and indigent people of their district, and spend money for other public purposes, and very often look with suspicion on an expensive road improvement program, when possibly the suspicion is due to the way the project was presented rather than to any defect in the plan. As a matter of fact, there are three ways in which to carry out such a scheme.

**F**IRST, a road can be constructed at once which is adequate for all traffic for a number of years. However, it is unwise to build temporary roads. If a road is worth building, it is worth building for permanency, and this should be the aim of every community.

**S**ECOND, the road can be graded and drained so that it will not need more work of this nature, but the surfacing can be a strip of broken stone 10 or 12 feet wide, in the center, with gravel on each; this surfacing can be maintained with bituminous treatment for a number of years, and after the travel has increased, a more durable surface can be constructed.

**T**HIRD, all of this work can be done in a permanent manner, and the dirt roadway can be used until travel becomes too heavy for a well-dragged earth road, when gravel, broken stone or other surfacing can be provided. The permanent work can be paid for by a bond issue or by annual taxes, but the temporary work should not be carried on by the proceeds of bonds. It is manifest that there is no hard and fast rule that can be followed in determining just what plan of construction and method of financing should be followed, but local road and financial conditions must settle what is best in each case. The advocates of these special routes can help along their aims by helping the local authorities to study the alternative possibilities.

### The Jackson Highway

**T**HAT the Jackson highway, or that part of it that has been definitely located, is not a paper road but one that is easily travelable and one that has unusually great mileage of first-class road for the length of time it has been in the process of building, is a fact with which anyone will agree after having traveled the road now forming a permanent part of this highway. Six hundred and sixty-eight miles of road with but 10 of it that cannot be driven at 35 miles per hour in comfort, such is the Jackson highway at the present time. A short stretch near Rensselaer, Ind., in the Kankakee river bottoms, is rough, but will be put in shape this summer, and even at the present time one can drive 15 to 18 miles per hour over it without difficulty. Another short stretch south of the Millport Knobs just before reaching New Albany, Ind., needs a few culverts and the elimination of some grade crossings, but money for this now is on hand and will be used this year.

**T**HE arm of the Jackson highway leading from Louisville to Maysville, Ky., could hardly be better. Here you can keep the speedometer on 35 for hour after hour if you like that speed, and most of the time you would think you were driving on a city pavement—and a good one at that. The road south of Louisville to Nashville, Tenn., is good except in Sand Hollow, a few miles south of the Lincoln farm, about 3 miles being very rough and full of hog-backs which do not make for comfort of body or mind in motor touring, but one expects to find a little bad road, and of all the many miles from Chicago to Nashville, this is the only place any difficulty will be experienced. However, with such men as Peter Lee Atherton, Emory G. Dent and J. G. Creveling interested in that section in particular, as well as all the others along the line, this short strip cannot remain in its present condition long.

**T**HE week from August 7 to 12 has been designated as good roads week along the Jackson highway and there promises to be many little bumps smoothed out in those 6 days, so that the tourist who drives south over this road next fall and winter will have an even easier drive than did the inspection party last week. By early winter this monument to the memory of Andrew Jackson promises to be finished, ready for Chicago-New Orleans traffic and officials of the highway are to be congratulated that they now have a real road, through a real country, serving a real need.



# Why Owners Do Not Get the Grade of Service Expected

## Dealer Has His Troubles as Well as the Man Who Looks to Him for Aid

SOMETHING was wrong with the electric starter. So the Akron, O., man who owned the car in question drove it to the garage where he had bought it. The garage was too crowded to admit the car and the machine was parked outside.

A day later the owner called for the car. It wasn't ready. He stormed into the garage man's office.

"When I bought that car you promised me service!" he raged. "Here my car has been laid up a whole day and isn't ready yet."

"Sorry," responded the dealer—and he meant it—"but there are so many cars ahead of yours we just couldn't get it out in time."

"Well, why don't you hire more mechanics?" inquired the car owner.

"We would if we could get them," said the dealer.

About this time a policeman came in and told the garage man to remove those parked cars from the street. So the indignant owner had to crank up his machine and take it further down the street before he could return to his office.

This is not a story of an exceptional case. It is but one instance of hundreds of the sort.

The number of new cars in Akron is increasing by hundreds each month. Garages are not big enough or numerous enough to hold them, though garages are springing up over the city like mushrooms over night. Mechanics of any sort cannot be hired in sufficient number to handle the work on hand while skilled mechanics are as rare as hidden treasure.

The situation is one which garage men find themselves unable to cope with. Garages built a few months or a year ago and judged big enough for years to come already are unable to handle much more than half the trade they get.

Only last spring a downtown garage was enlarged by the construction of an addition containing 22,000 square feet. Now this new space is far from adequate and a second story with an equal floor room must be provided.

### HAD-A-CAR-ONCE ASSOCIATION

A local or state organization of persons, who at one time or other were the happy owners of motor cars, but who, as a result of the predatory inclinations of others, now are compelled to walk or use street cars, is being suggested by Dr. Charles K. Beck, Louisville, Ky., whose car was stolen recently. His plan is energetically backed by other former motorists who have had their cars stolen during the last 3 weeks. An Indianapolis man, whose machine was

stolen in Louisville, will become one of the charter members of the association, it is believed, for which the following names are suggested: "Once-Upon-a-Time Club," and "Had-a-Car-Once Association."

### Cars Raise Dickens with Cows and Chickens

THE motor car not only is crowding out the horse, but the cow as well, and the chickens will be the next to go, according to feed and produce men of Kansas. Feed dealers say that there is not 5 per cent of the horses maintained in the small towns now that there were 10 years ago. And when a family disposes of its horse the next step is to get rid of the cow and buy milk of the dairyman. The third step seems to be to eliminate the chickens also,

since poultry has from time immemorial been considered a necessary corollary to live stock, and has not yet found its point of contact with a car. For one thing, a motor car does not stay put long enough for a hen to get any enjoyment out of roosting or laying eggs in it.

### NO LOUIS HILL FALLS

St. Paul, Minn.—Editor Motor Age—I have just seen copy of the Motor Age for June 22, noting particularly a couple of photographs of waterfalls in Glacier National Park, one of them given as Louis Hill Falls. There are no such falls as the Louis Hill Falls. The real name of the falls is Appekunny, which is an old Indian name, and it is absurd to try to change it, as its proper name will doubtless remain with the falls.—Louis W. Hill, president Great Northern Railway Co.

## See America First — • • • See America Now



EDITOR'S NOTE—This is the eighty-fifth of a series of illustrations and thumb-nail sketches of the scenic and historic wonders of America to be published in Motor Age for the purpose of calling the attention of motorists to the points of interest in their own country.

NO. 85—HISTORIC OLD CEMETERY IN BOSTON, MASS.

**D**OWN in New England are found the last resting places of many of our prominent Americans—men and women who have made the history of our country. One of these cities of the dead is shown above—that which lies within the limits of Boston.

## U. S. May Seize Plants

Failure to Deliver Motor Equipment Ordered Presents Peculiar Angle

European War Orders Must Take Back Seat

WASHINGTON, D. C., July 1—Negotiations have been under way during the last week for the purchase by the War Department of some 1,800 motor trucks for use by the army in connection with the Mexican operations, and some contracts for the machines have been placed. Difficulty has been encountered in obtaining satisfactory terms of delivery, due to the fact that the motor truck manufacturers are largely engaged in filling European orders. The situation may result in the war department availing itself of the authority contained in section 120 of the army act of June 3, relating to the purchase of military supplies in time of actual or imminent war. Failure to fill orders as desired may lead, under the terms of this act, to seizure of a plant by the government and the manufacture under departmental supervision of the material that may be required.

It is proposed to purchase enough motor trucks to equip fifty-two companies, each company having thirty-three trucks—thirty cargo trucks, one kitchen truck and repair truck and two gasoline supply trucks. The trucks are about equally divided as to capacity between the 3-ton and 1½-ton types. These and more trucks will be required, on account of the increase in the military operations, and later on, if there is any extensive fighting, it will be necessary to acquire ammunition trucks. It is estimated that some \$10,000,000 will have been spent on motor transportation alone.

### NEW GENERAL MOTORS DIRECTORS

Detroit, Mich., July 3—Following a policy of having the various units of its organization as representative as possible on the board of directors, the General Motors Co., at a meeting in New York on June 27, elected W. L. Day, general manager of the General Motors Truck Co., and Fred W. Warner, general manager of the Oakland Motor Car Co., both at Pontiac, Mich., to the board of directors. These elections fill vacancies occasioned by the resignations on June 1 of three members of the banking interests that had aided in tiding the organization over its period of depression some years ago.

Those resigning at the time of the election of W. C. Durant to the presidency to succeed C. W. Nash were Albert Strauss, of J. & W. Seligman & Co.; J. J. Storrow, of Lee, Higginson & Co., both of New York, and Emory W. Clark, head of the First and Old Detroit National Bank of Detroit.

To fill one of these vacancies on the board W. C. Leland, vice-president and general manager of the Cadillac Motor Car Co., was elected at the June 1 meeting, and Day and Warner have now completed the directorate.

Both Day and Warner are old farm implement men who, like many others in the industry, graduated to the motor car business after long years of experience in the other line. Day came to the truck unit in 1912, leaving the Mitchell-Lewis Motor Co., where he was general manager. Before his connection with the latter concern he had been for 27 years general manager of the Parlin & Orrendorff Plow Co. at Kansas City. Warner 2 years ago took up the Oakland management, coming from Chicago, where he had managed the Buick branch. Prior to his connection with Buick he had long been connected with the John Deere Plow Co., also at Kansas City. Both men have made a striking success of the General Motors units they are now managing.

### NEW YORK-CHICAGO SHOW DATES

New York, June 30—The National Automobile Chamber of Commerce has announced the 1917 show dates. The New York show will be held at the Grand Central Palace January 6 to 13, inclusive, while the Chicago date is from January 27 to February 3, inclusive.

### OVERLAND EARNS \$4,377,799

New York, June 30—The Willys-Overland Co. reports to the local stock exchange for the 4 months ended April 30, 1916: Net earnings all companies, \$4,377,799; interest on floating debt, \$184,655; surplus, \$4,193,144. The \$1,500,000 Willys-Overland common stock which has just been listed on the stock exchange is the stock which was specifically reserved for that purpose when the authorized capitalization was increased by action of the stockholders last January.

### NEWMAN EXTENDS TERRITORY

Milwaukee, Wis., July 1—Announcement was made today that Harry Newman, Inc., since December 1, 1915, distributor of Chalmers cars in Wisconsin, northern Michigan and southeastern Minnesota, with headquarters at 701 Grand avenue, Milwaukee, has been appointed Chicago distributor and will establish stores in Chicago and Springfield, Ill., in addition to that at Milwaukee. The new territory, which will be served from the Chicago store, Michigan avenue and Twenty-fifth street, includes Illinois, north and western Indiana, eastern Iowa, bordering on the Mississippi river, and northeastern Missouri. It is stated that the Newman company has contracted with the Chalmers Motor Co. for more than 5,000 cars for the fiscal year ending July 1, 1917, representing a season's business in excess of \$6,000,000.

## Western Boosting Tour

Millionaire Kansan Heads Movement for New National Highway

Traveling 3,000 Miles Over Proposed Park-to-Park Route

SEATTLE, Wash., June 29—Covered with dust but happy and browned with the sun of the tourist, Thomas J. Crook, millionaire inventor and good roads booster, of Wichita, Kan., arrived in Seattle, Thursday, June 15, in a Chalmers Six-30, accompanied by his son and secretary, W. C. Evans, after a tour of the proposed Park-to-Park Highway.

The party left Wichita May 15 and will leave Seattle this week over the Pacific Highway through Washington, Oregon and California to Los Angeles, whence they will start on the last lap of their journey around the circle. They will follow the Santa Fe Trail from California to Kansas.

Mr. Crook, credited with being the wealthiest man in Kansas, is making this 3,000-mile tour in the hope of stirring up sufficient interest in the Park-to-Park Highway to obtain Federal aid in building a national highway linking the great national parks of the west.

This road, starting at Denver, Colo., would touch the Rocky mountains in Colorado, going thence over the Yellowstone Highway to Yellowstone National Park. From there it would go to Glacier, thence west across Snoqualmie Pass to Mt. Ranier, St. Helens, Mt. Hood, Crater lake and Sequoia Park and on to Los Angeles by the Yosemite valley. The circle turns east at this point and takes in the Grand Canyon of the Colorado, Mesa Verde and the Pike's Peak region before linking up with the Denver starting point.

North Dakota devoted two entire days last week to making repairs on the National Parks highway. It is estimated that fully 400 miles of roads were put in good condition for the trip and that over 6,000 enthusiasts were engaged in these improvements. It has also been arranged that drags and rollers will go over the route on the day before the tour is scheduled to pass over them. The North Dakota good roads day was instigated by Gov. L. B. Hanna, who will be a participant in the trip when it crosses North Dakota July 22, 23 and 24.

More information relative to the character of entertainment to be provided at each control is daily reaching the committee. C. W. Fowler, secretary of the Billings Chamber of Commerce, has promised that a program unique in every detail will be carried out. He assured J. P. Hardy, secretary of the tour committee, that the motorists will remember their stay in Billings for a long time.

H. M. Otis, secretary of the Miles City round-up and a former Minneapolis news-



paper man, is already at work with plans for carrying out the entertainment in the famous horse market. These will include daring horseback riding and will be concluded with a typical "cow-punchers'" exhibition.

Golf, a boat ride up the Missouri river, tennis playing and a smoker will be a part of the program being planned at Bismarek and Mandan. At the latter city 25 members of the local motor car club will join the tour and continue the trip to the Yellowstone.

#### BRUNSWICK-BALKE MAKING TIRES

Chicago, July 1—The Brunswick-Balke Collender Co., for many years one of the largest factors in the manufacture of sporting goods, has greatly increased its rubber factory capacity and announces its entrance into the motor car field, with a complete line of rubber parts and accessories, from tires to the smallest rubber unit found on a car. J. E. Duffield is manager of the tire department.

A newly-erected addition to the factory at Muskegon, Mich., will house the manufacture of the Brunswick Skid-Not tire, which will be of the wrapped tread single cure type with black tread and side walls. The Skid-Not will have some novel features, full announcement of which will be made to the trade at an early date.

#### MOTOR CLUB FOR DETROIT

Detroit, Mich., July 1—Tentative plans have been made for the formation of a motor club in this city, to be known as the Detroit Automobile Club. Several prominent figures in the industry here held an informal meeting this week and decided that such an organization had a place in this city, above all others in the country. It is intended to identify the new organization with the American Automobile Association, and some of the objects will be to work actively for good roads, for legislation favorable to motorists, and for other similar causes. At the present time Detroit has no organization affiliated with the A. A. A. Some of those interested in the new project are W. E. Metzger, A. O. Dunk, M. L. Puncher and others. It is intended to call a general meeting of motorists to perfect the organization.

#### HIGRADE MOTORS IN GRAND RAPIDS

Grand Rapids, Mich., June 30—Business men in this city have pledged \$50,000 for the erection of a plant for the Higrade Motors Co., which will build commercial vehicles.

As proposed by J. E. Pratt, W. J. Loomis and L. W. Coppock of the company, \$100,000 cash working capital will be put up by the Higrade company, providing the business men of Grand Rapids will buy the site of 20 acres, selected by Pratt and his associates, and will build the plant on five acres of it. The plant will be leased at 7 per cent of the cost, plus 3 per cent for depreciation of buildings.

## The Adamson Bill Loses Measure to Give Car Owner Unlimited Interstate License Privileges Killed

### No Further Chance for It During This Session of Congress

WASHINGTON, D. C., July 3—Special telegram—The Adamson bill to regulate interstate use of motor cars which use the public highways in interstate commerce has been dealt a solar plexus blow by Congressman Coady of Maryland. The bill came up in Congress on the unanimous consent calendar. Coady objected and under the rules the objection was not debatable so the measure was stricken from the calendar. This means that the bill has no other opportunity to come before the house at this session. It is understood that Majority Leader Kitchen and Minority Leader Mann are both opposed to the bills, which means that it has no chance whatever at this session.

This bill was championed by the American Automobile Association and was designed to allow the car owner with his home license tag unlimited privileges in other states. In other words he would not have to take out license in other states where he stayed more than the customary 2 weeks or a month had the bill passed.

#### TO FINISH B. C. ROAD

Vancouver, B. C., June 30—An act has been passed by British Columbia which insures the completion and maintenance of the Banff-Windermere scenic highway. To date the government has spent \$277,000 on the road; under the agreement with the Dominion, the federal government will take over the highway and in return will receive title to 5 miles of provincial land along the highway. This land will be made into game reserves and national parks by order of the Federal authorities.

#### TRACTOR SHOW INTERESTS

Dallas, Texas, July 1—That the interest in the First National Tractor Show to be held at Dallas, July 18 to 21, inclusive, is even greater than the committee in charge of arrangements had expected, is indicated by the hundreds of queries that are received daily and by reservations that are being made at local hotels. Indications are, and plans to that end are being made, that 200,000 people will witness the tractor demonstrations.

Already there have been 123 tractors registered for the demonstration, and before the week ends it is expected numerous others will be registered.

#### FORD MEN CONFER

Detroit, Mich., July 1—The annual sales conference of the Ford Motor Co. has been in progress here this week, managers and assistant managers of the twenty-eight

branches of the company in the United States and of the fifty-one sales and service branches throughout the country being in attendance. These men are responsible to a large extent for the marketing of half a million Ford cars for the present fiscal year, which ends July 31, and on them will depend a great deal of the success of the contemplated marketing of 1,000,000 Fords for the next fiscal year. Somewhat over 500,000 cars will have been built when the present year ends.

#### NEW MILWAUKEE TIRE COMPANY

Milwaukee, Wis., July 1—The Pan-American Rubber Co. has been organized at Milwaukee with a capital stock of \$200,000 to manufacture a patented inner tire, known as the cellular pneumatic inner tire. The concern takes over the business of the Sporub Tire Co., which has been manufacturing inner tires for about 10 months.

Factory quarters have been leased in the Kopmeier building, Third and Prairie streets, and a large production is planned. At this time about fifty tires are being manufactured daily, but within a short time the number will be increased to 100, and within 60 days to 200.

F. J. Ramler, H. C. Clauson and Norman J. Kopmeier appear as incorporators of the new company. F. J. Ramler is president and general manager. He is half owner of the Standard Racine Rubber Co., Milwaukee, and a large stockholder in the Racine Rubber Co., Racine, Wis. He has been engaged in the rubber and tire business for more than 16 years.

#### FOSTORIA PRICES UP

Fostoria, O., July 1—The Fostoria Light Car Co. announces certain changes in its models and new prices becoming effective today.

The price of the touring car has been raised to \$735, the delivery wagon with an open body to \$695 and with a closed body to \$715, and the width of the rear seat has been increased from 39 to 46 inches and the front seat from 37 to 42 inches. Floating rear axle, Remy ignition with distributor, and automatic sparkers now is used.

#### STUTZ STOCK ALL PURCHASED

New York, June 30—The Stutz Motor Car Co. of America, which was recently organized by A. A. Ryan and associates, has completed the purchase of all the stock of the Stutz Motor Car Co. of Indiana. The company is planning a larger output. In 1912 it produced 266 cars; in 1915, 1,079; while for the 5½ months ended June 15, the output was 874 cars.

Within 4 or 5 weeks the new plant, which is as large as the existing factory, will be in operation. At the present rate, it is estimated that the company will earn in 1916 at least \$750,000, which will be available for dividends, amounting to \$10 a share on its 75,000 shares of stock.

# Enlisted Employees of Car Factories to Receive Full Pay



Army transport trucks with General Pershing's column in Mexico. When a halt is made at noon or night the trucks are arranged to form a bulwark for the troops in case of attack



A U. S. soldier of Capt. Boyd's command wounded in the battle with the Mexicans at Carrizal photographed while being removed from the motor ambulance which brought him from Gen. Pershing's headquarters to the base hospital at El Paso, Tex.

**M**OTOR car and accessory makers are among the first to indorse the support of the families of their employes who are joining the army, and make assurances that their positions will await them upon their return from the front. Individuals have made offers to purchase ambulances for the hospital corps and in a number of instances associations and groups of men have offered armored trucks for the militia and regulars.

The north-side residents of Chicago requested government permission to equip the regulars with a Jeffery armored truck, but the offer was refused inasmuch as the

army officials consider it unwise to sacrifice the government standard of trucks by accepting donations of various makes of cars. Although in this particular instance the Jeffery truck complied with government specifications it was not the desire of the officials to establish a precedent.

## Pittsburg Offers Seventeen

The military training association of Pittsburg has offered seventeen armored motor trucks to be used as a part of the equipment of the First Pittsburg volunteer regiment. The total cost of these machines will be \$25,000 or more. Before the use of the machines by the regiment is as-

## Manufacturers Decide to Pay Men While in Government Service

sured the consent of the war department is necessary.

Offers have been made by individuals in Kansas City to pay for Packard ambulances to go with the hospital corps connected with the third regiment, Missouri National Guard. There is no motor equipment with the regiment now, though the use of cars and trucks greatly expedited the collection of the paraphernalia and men for the movement of militia to the assembly at Nevada last week.

## Tire Factories in Van

The large tire factories of Akron are in the van in their announcement of compensation and open positions for all employes who are enrolled in the state militia or who enlist for service on the border and in Mexico.

The Goodyear Tire & Rubber Co., Akron, O., has presented to Battery B, Ohio Field Artillery, stationed at Akron, a fully equipped military kite balloon ready for immediate use. The balloon is of the same type as the one recently delivered to the United States navy for use at the naval aeronautical station at Pensacola, Fla. It was designed and made entirely in the Goodyear factory.

The plan of the Goodrich company is to give soldier employes of the company, who are either married or single and support-



ing dependents two-thirds of their average pay, based on their earnings during the past 3 months, after making deductions of the amount received from the government.

The Firestone plan is to give all employees who have been with the company for three years, who have enlisted prior to June 20, full pay, less the government allowance. Employees of one to three years, two thirds pay, less the government allowance and less than one year, one-half pay, less the government allowance. The arrangement will hold good for one year and will also apply to all employees who enlist hereafter, down to six months' service with the company. The Goodyear company makes a similar announcement agreeing to give its employees a large part of their pay, less the government allowance.

President James Newton Gunn, of the United States Tire Co., announced that all employees of that corporation who are members of the militia and called on active service would receive full pay during their absence.

The Studebaker Corp. has arranged to place all men who go to the border on full pay for the balance of the year, as an encouragement to patriotism and as an appreciation of their enlisting.

One hundred and eight Packard men have reported that they were answering the call to the colors, and it is known that others joined their companies without notifying the employment department. Upon the return of any or all of these men to the factory they will be given their old positions or other employment paying equally well. Among the employees also are fourteen naval reserves. Packard employees who have been called out with the national guard will receive their full pay for the two weeks' period immediately following the mobilization order.

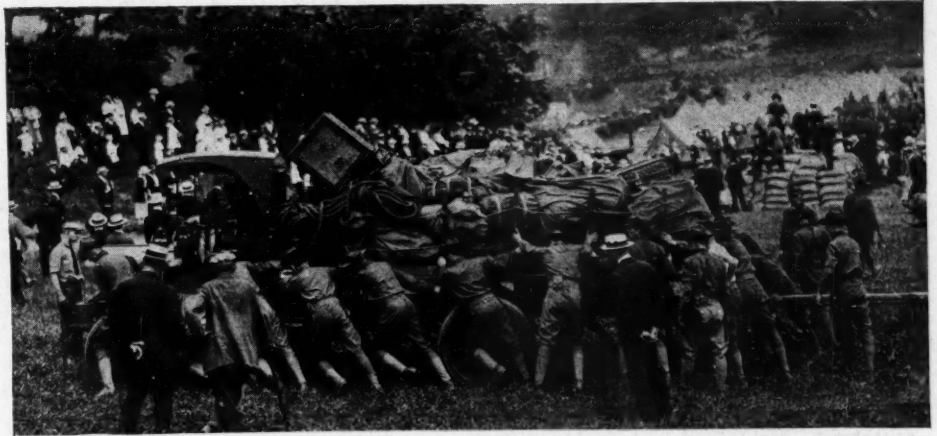
Benjamin Briscoe made the announcement that the families of soldier employees of the ten factories of the corporation of which he is the head are to be placed on the company's payroll during the guardsmen's service to their country in Mexico.

#### REPAIR SHOP TOO HEAVY

Columbus, N. M., June 30—A big truck with a complete traveling machine shop stands in the army yards here, carefully covered to protect it from dust and the glaring hot sun. The equipment is the best that money can buy, but officers of the quartermaster corps are wondering what they will do with the outfit.

As it stands, the outfit is said to weigh 13 tons. Trucks with loads having a total weight of under 4 tons are having difficulty with the sands of the Mexican desert. Bets are being made as to whether the traveling machine shop would reach China or Timbuctoo if sent out on the road.

The idea was to have these traveling shops go with the truck trains and make any repairs which might be necessary. On paved roads, the scheme would work out to perfection.



A heavily loaded truck being towed out of a rut in Van Cortlandt Park, New York, before the departure of the New York first field artillery for the border to join the other forces already there. General Pershing standing beside his motor car. Colonel Cabell is seated in the back and in the front seat is one of Colonel Cabell's aides. This photograph was taken "somewhere in Mexico" Battery F of the first field artillery, New York national guard, loading a truck preparatory for leaving for the border. This practice puts them in good form for quick service when in actual work Mobilization of the New York national guard at Camp Whitman, Beekman, N. Y. The troopers are shown unloading bake oven equipment of the 22nd engineers' corps

# Motor Trucks Run on Concrete Rails

## Texan Plans New Type of Road for Heavy Traffic

EL PASO, Tex., June 30—Motor trucks carrying freight and passengers and operating over their own line of concrete "rails" is the proposal that comes from Tucumcari, where a company is now being floated to build a line between Clovis and Tucumcari, a distance of 88 miles.

The chief promoter is James F. O'Rourke, one of the best known railroad men in the southwest. Mr. O'Rourke is seeking a patent on his new motor way. It calls for two outer grooved "rails" of concrete, 12 inches in width and 8 inches deep, with a center "rail" 30 inches wide and 5 inches deep. This center "rail" will be perfectly flat and not grooved, as the outer "rails."

The steam railroads between Clovis and Tucumcari takes a roundabout route. Schedule time is about 12 to 14 hours. Mr. O'Rourke plans to make the run with passenger trucks in 4 hours.

The country is a rich farming district and the company expects to get a big business from the farmers, some of whom are 25 miles from the present railroads and have to pay as high as 25 cents per bushel to get out their wheat. The new company expects to be able to haul the wheat to Tucumcari or Clovis for about 5 cents per bushel.

"We will have both passenger and freight trucks out of each terminal every morning," said Mr. O'Rourke. "Farmers can be sure of having their produce on the El Paso market the second day after shipment. We will sell running rights over our line to privately owned passenger cars at 1 cent per mile.

"Service telephones will be located every 5 miles and we will have service cars at the disposal of any unlucky motorists. On account of our saving in time, we hope, also, to get the government mail contract."

The estimated cost of the line, including the necessary truck equipment, has been placed at less than \$1,000 per mile. A great deal of the right-of-way, which is to be only 15 feet in width, has been donated by the landowners who see rapid transportation to their farm lands. Tucumcari people are taking stock in the new concern and Mr. O'Rourke states that there will be no need to seek outside capital. Construction is expected to start in the near future.

### LICENSE TROUBLE IN MAINE

Augusta, Me., June 30—Motor dealers throughout Maine are somewhat anxious as to what is in store for them following a communication from Secretary of State John E. Bunker to Chief of Police Stone of Biddeford a few days ago. Mr. Bunker stated to the chief of police that he had

received information to the effect that Biddeford motor car dealers were using their cars with their dealers' registration numbers for pleasure riding and livery work. This was contrary to the law, Chief Stone was told.

The dealers are not worried about the livery part of the letter for few of them do that, but on Sundays and other days they feel that they have a right to use their cars to go out for a ride or take their families for a little recreation if they have the time. They wonder just what will happen in case Chief Stone does not make any arrests. In that case Secretary of State Bunker has the upper hand, for he can suspend the garage license of the dealers and put them out of business. And if he does it in one instance, he will have to do it all over the state.

In that event every dealer will have to either register one car as his own personal pleasure machine for use on other than business purposes, or stop his riding except when giving demonstrations. The dealers consider this as unfair, as they feel that when the law was passed the legislature had no intention of placing such restrictions upon them. It puts the police officials throughout the State in a quandary for they cannot tell when a man is riding for pleasure or giving a demonstration. That the dealers will attempt to have the law changed or a different interpretation made is evident, for though the law is similar to the one in many other states the Maine dealers have never heard of any such a decision being made elsewhere.

### NATIONAL PARK BILL PASSES

Washington, D. C., July 3—Special telegram—The house of representatives has passed the Kent bill to create a national park service with a comprehensive system of supervision. The bill creates a bureau in the Department of Interior to have in charge existing national parks and those to be established by Congress. The passage of the bill by the house is a big victory for those who have been advocating "See America First."

### CORTLAND CO. EXPANDING

Sidney, N. Y., June 30—The Cortland Cart & Carriage Co., maker of the Hatfield roadster, suburban car, light delivery and light express cars, and which recently increased its capital from \$75,000 to \$225,000 to take care of a more active production of its products, is now making distribution of its cars within a comparatively small radius of this city. The company states that it will not build more than a very few hundred cars for the next year or so.

The models are equipped with a four-cylinder block L-head motor developing 32 horsepower, the bore being 3 3/4 inches and the stroke 4 1/4. Other features include: thermo-syphon cooling; selective, sliding gear transmission with three speeds forward; disc clutch positively coupled to transmission; constant level splash lubrication; Connecticut ignition; Stromberg carbureter; Hotchkiss drive with two universals; semi-elliptic springs in front and starter; and floating rear axle. The model H, three-passenger roadster sells for \$875, the suburban car for \$800, the light delivery cantilever, floating type in rear; Discoery for \$820, and the light express for \$765.

### SEVENTY-FIVE MILLION FOR ROADS

Washington, D. C., June 30—It took the house less than 2 hours to pass the urgent deficiency military bill carrying appropriations in excess of \$27,000,000 for the immediate use of the army in Mexico and along the border. Democratic and Republican leaders combined to hasten the passage of the measure.

The house also passed the good roads measure with an authorization of \$75,000,000 for allotment to the states and \$10,000,000 for roads in the national forests. The conference report on it was agreed to after only a few minutes debate.

### MILWAUKEE PLANS SHOW

Milwaukee, Wis., June 30—Plans for the second annual motor show held in connection with the Wisconsin State Fair by the Milwaukee Automobile Dealers, Inc., are rapidly taking definite shape. The association has again leased the entire machinery building and will again charge a small admission fee. The building is one of the largest on the big state fair grounds at West Allis, 5 miles from the Milwaukee city hall. The fair will open Sunday, September 10 and close Saturday, September 16. There will be a motor racing program on Friday and Saturday. The tours committee is preparing for another big booster tour through Wisconsin to advertise the state fair show.

### SEPARATOR ORDINANCE UPHELD

New York, June 30—The gasoline separator ordinance against which the dealers and garagemen of New York city have fought for years, has been sustained by the courts. Prosecutions under the ordinance have been held up by the authorities depending on the issue, and it is stated that enforcements of the law will now be required. This ordinance requires the installation in every garage of a device which is designed to separate from the floor sewage any escaping oil or gasoline.

The devices have proven expensive, costing from \$200 up, and the motor interests have maintained that the separators will not do the work and are a needless ex-



pense. Exhaustive tests have been made by both sides in the controversy.

The dealers succeeded in having the ordinance repealed by the Board of Aldermen, but their repeal was vetoed by the mayor and an attempt to pass the repeal over his veto failed.

The Bronx Garage then brought a mandamus action to require the issuance of a garage permit in the garage which had no separator. A jury trial was secured and the decision was favorable to the dealers, but the city carried an appeal to the appellate division of the supreme court and the latter has decided that the jury trial was improper and that the ordinance is essential to the welfare of the city. The motor car interests are considering further steps in the matter.

#### DELLING TO LEAVE MERCER

New York, June 30—It is stated on good authority that Eric H. Delling, chief engineer and designer of the Mercer Automobile Co., expects to sever his connections with that concern to develop a new car which probably will bear his name. While nothing definite could be learned about the matter, it is believed a company is being formed to carry out Mr. Delling's ideas. If this information is correct the new car will be anticipated with a great deal of interest as Mr. Delling is recognized here and abroad as one of the foremost engineers.

#### LAMP COMBINATION DIVIDENDS

Detroit, June 30—The common stock of the Edmunds & Jones Corp., which in March took over the Edmunds & Jones Mfg. Co., Detroit, the Canadian Lamp & Stamping Co., Ford City, Canada, and the Chicago Electric Mfg. Co., Chicago, was today placed upon a dividend basis of \$4 per share. The combination ranks as the largest maker of electric, acetylene and oil lamps for automobiles and trucks.

#### U. S. TRUCK REPAIR PLANT

El Paso, Tex., July 1—Seven thousand trucks belonging to the United States government will be taken care of in an immense repair shop located at Fort Bliss, if the plans of the United States army are carried through. There are now, or will be within the next few days, a total of 1,050 trucks and about 125 touring cars and roadsters in army service along the border. Repairs at present are made at the camp at Columbus or in private plants.

Two thousand trucks and their tenders were asked for early in the week for immediate delivery. Another 4,000 were ordered last Thursday. There will be fifty-two big lathes in the huge shops at Fort Bliss. Mechanics will be paid approximately \$100 a month, but will be required to enlist in the regular army for a period of 1 year. The contract for gasoline held by the United States government has expired. It called for the delivery of gasoline along the border at 10 cents a gallon.

## New England Roads in Bad Condition

### Rain Has Hurt Highways—New Hampshire and Maine Making Repairs

BOSTON, Mass., June 30—Motorists planning to visit New England in the new few weeks will find some deplorable road conditions in a number of places, but it is expected that after about July 4 there will be much improved conditions. In Massachusetts the highways are practically in good shape, at least the main trunk lines. Where repairs have been going on and detours had to be made the detour routes were much worse than the roads under construction. In the western part of the state on the trunk line over the Northern or Mohawk trail route there is a detour east of Greenfield that has caused mishaps to a number of cars. Others that went along where the construction work was in progress did not mind it. A veteran tourist refuses always to make the detours, for he claims that the sign "Dangerous, but passable," by the Massachusetts Highway Commission is really more of a bogey than a reality.

In New Hampshire some of the highways are quagmires just now. The rain has been so frequent that there has not been any chance to dry out the gravel roads. Those who plan to go anywhere in the vicinity of Dublin, one of the noted summer resort towns, should avoid it. On the Bay State A. A. run a few days ago the drivers had to go 2 miles an hour, and then were in danger of slipping over. They were worse than the roads on old Glidden tour days. A week of good hot weather will help a whole lot.

Maine is doing the best it can despite a lot of rain that put the highways outside the cities in horrible shape. But the road officials are doing their utmost to fix things up. In Vermont the highways are bad in spots where there is a thick growth of trees that hold the rain and prevent the sun from beating through and drying the surface up. Rhode Island roads are pretty well along the through routes. In Connecticut they are good also. So the tourist should go east to Boston by the main trunk road in Massachusetts, and inquire before going north from there.

#### YELLOWSTONE TOUR LIST GROWS

St. Paul, Minn., July 1—Good roads work has been an important feature along the National Parks highway in North Dakota the last month, occasioned by the coming sociability tour to Yellowstone National Park. Although the tourists do not leave the Twin Cities until July 20, almost all of June was devoted to improvements along this route.

Twenty-five entries were received up to last night for the excursion and it is indicated that a number of Indiana motorists will be added to the list during the

next 2 weeks. Several members of the Chicago Automobile club also are expected and Secretary J. P. Hardy, of the tour committee, expects three cars from Detroit, Mich., to participate.

Hazen J. Titus, superintendent of dining car service of the Northern Pacific railway, has notified the committee that three 75-pound cakes will be offered to participants. One will go to the entrant who drives his car the greatest distance to start on the tour, another to the owner in whose machine the largest number of ladies ride through the arch at Gardiner entrance to Yellowstone Park, while the third will be given to the entrant who carries the largest number of passengers the entire distance.

#### JERSEY CITY-WASHINGTON RECORD

Washington, D. C., June 30—By covering the 238.2 miles between Jersey City and Washington in 7 hours and 26 minutes, a Haynes six touring car, driven by D. B. Gish, set a record that will stand for some time. The mark is but 2 hours slower than that of the fastest trains between the two points. The route leads through the most thickly settled portion of the United States. Road conditions are good, but travel at all points is congested.

In 1911 S. A. Luttell, in a four-cylinder Packard touring car, set the first mark. His time was 11 hours and 41 minutes. This mark stood for 4 years. In 1915 D. S. Hendrick in a Franklin clipped 2 hours and 32 minutes from this record. His time was 9 hours and 9 minutes. Two weeks later E. B. Terry, in an Apperson, lowered the Hendrick mark by 27 minutes, making the distance in 8 hours and 42 minutes.

#### BURY PRIZE AT RUN FINISH

Philadelphia, Pa., June 30—One hundred dollars will be buried in the beach at Wildwood, N. J., on July 1. It will be put there by the Automobile Club of Delaware County, which will hold a run to the resort. The entrant finding the money, after being given a tangible clue, is heir to it. To make the event still more attractive and novel the city of Wildwood will pay \$100 in gold to the person arriving at the end of the route nearest scheduled time, and will distribute \$200 more to those next nearest.

Other cash prizes are contemplated. Among the various events are: An obstacle race on a roped-off section of the beach; and a parade of decorated cars in which the best decorated will receive prizes. It is estimated that 500 cars, representing a score of clubs, will participate. Among the guests will be Mayor Smith of Philadelphia.

# Fuel Problem Given Serious Consideration by N. G. E. A.

## Three-Day Convention in Chicago Brings Out Some Valuable Discussions on Engines

CHICAGO, June 29—Tractor and gas-engine men are as much exercised over the present and prospective fuel situation as are the motor car makers, if the purport of the papers and discussions, at the ninth annual meeting of the National Gas Engine Association is any criterion. The convention of the N. G. E. A., which closed today after a 3-day session at Hotel Sherman, was featured by a number of papers and discussions on tractors, and another series on various ramifications of the fuel problem. Other papers of interest, from the manufacturing standpoint, included scientific management of factories, uniform methods of figuring costs, ignition selections, reducing shop cost, and an address by Dr. Frank R. Rutter, assistant chief of the Bureau of Foreign and Domestic Commerce, on the internal combustion engine in foreign trade.

Affiliation of the National Gas Engine Association with the Society of Automobile Engineers was broached informally at the business meeting yesterday, by John T. R. Bell, engineering representative of the Norma Co. of America, and a member of both societies. In the informal discussion it was pointed out that the standards committee of the gas engine association has been working in very close touch with the standards committee of the S. A. E. and has adopted, wherever possible, the standards already in force among the motor car manufacturers, and also that two other associations in allied industries, the marine engineers and the aeronautic engineers, have asked to become affiliated with the Society of Automobile Engineers.

### Merging Plans Incomplete

Inasmuch as complete plans for the co-operation of these societies have not been worked out as yet, it was decided to defer action for the time being. Comment in general was favorable.

The standards committee adopted standard specifications for a number of features of gas engines, and it was notable that recommendations were, in so far as possible, to follow the present standards of the Society of Automobile Engineers. The association formally adopted a standard guarantee for gas engines warranting them to be free from defects in materials and specifying replacement of parts proved defective in material for a period of 1 year. This does not include ignition or other accessories which are guaranteed by their manufacturers. The engines also are warranted to develop rated horsepower and rated speed in factory testing room.

At the election of officers the president, secretary and treasurer were re-elected, as were most of the vice-presidents and executive committee. C. B. Bement, of the Novo

Engine Co., Lansing, Mich., is president. H. R. Brate is secretary, and Otto M. Knoblock, treasurer.

That former low price of gasoline is a thing of the past, is the belief of E. E. Grant, secretary of the Independent Oil Mens' Association, of Chicago, who in an address entitled the "Fuel Problem as it Pertains to the Internal Combustion Engine," discussed the factors which have caused the rise in the price of gasoline and the probabilities of the future. He stated that it is his belief that the average price of the future would be from 15 to 25 cents, and does not anticipate that the cost to the consumer would be very much less than 15 cents or very much higher than 25, at least for several years.

He confirmed the general impression among gasoline users that the demand for motor fuel has become so enormous that quite frequently the quantity of fuel is increased by adulteration. He made a plea for co-operation between oil men and engine makers and proposed an association of gas engine, motor-car, marine and aviation engineers and the oil men—experts who could work together for the solution of a proper fuel and mechanism to handle it.

He brought out the point that during the last 2 years the increase in the price of crude oil had been 700 per cent and in addition to that, it often is necessary to pay premiums over the market price. He figured that the consumption of gasoline for 1916 would be 1,934,000,000 gallons, but stated that much progress in increasing the yield had been made within the past year, and that at present 2 per cent of the gasoline is made from natural gas. The gasoline from this source has a low boiling point of 65 to 85 degrees Fahrenheit and a high boiling point of 300 degrees Fahrenheit.

He mentioned the fact that a process of pressure distillation for increasing the yield from crude was patented by a Doctor Parker as early as 1907, this ante-dating both the Rittman and the Burton process patents.

He emphasized the need of the development of engines to use low-grade distillates, and stated that when the troubles with Mexico are over, that country will be able to supply sufficient crude for the entire world—this, however, is not rich in gasoline. Seventy-five per cent of the oil industry in Mexico at the present time is owned and controlled by American capital.

Mr. Hall also confirmed the general impression as to the decrease in Beaume gravity of motor fuel during the past 2 years. He stated that not long ago, gasoline of 76 degrees Beaume was common. Now it is

not over 58 degrees and sometimes as low as 50. Within the next 2 years it will be somewhat lower than 50 degrees Beaume. He said that gasoline users are gradually coming to kerosene and that before long we may expect to be using kerosene. He believes that within 5 years, engines would be so designed and distillation process so refined that of the crude oil, 75 per cent will be used as fuel and the remaining 25 per cent as lubricant.

In the discussion, Mr. Hall was asked, since the profit of 3 cents between the cost of manufacture and selling price of gasoline is reasonable, why the profit between 3 cents for the manufacturer of kerosene and the sale price of 10½ cents. In answer Mr. Hall said it is impossible to figure it that way and that is one of the points that is engaging the Federal Trade Commission at the present moment; that it is competition that set the price of crude and set the price of the finished product.

In the discussion of E. W. Roberts' paper on Liquid Fuels, Present and Future, the fact was brought out, that in England there has been considerable experimenting with the use of pulverized coal, and in Germany with naphthalene. No one, however, recalled the fiasco of a few years ago with Zoline, which was supposed to be chiefly naphthalene and water.

The statement was made that it would not be surprising in a few years to see gas engines using coal as fuel. In confirming this Mr. Knowles stated that his company has been experimenting with coal in solution in water, that it could not be pulverized so fine, that it partakes of the nature of deflocculated graphite and can be atomized and injected into burner just the same as fuel oil, and that subtracting the heat necessary to dispose of the water there would be left 13,000 British thermal units per pound of heat from the coal. The chief difficulty with its use in internal combustion engines would be the ashes.

### Carburetion

By Edward E. Dean, Engineer, Byrne, Kingston Co., Kokomo, Ind.

THE author treated on the stages necessary in converting liquid into gas for explosive purposes and the things which would have to be perfected in order to create a successful motor to burn low-grade fuels. He divided the factors into three stages, atomization, vaporization and gasification, and stated that if these three stages be accomplished successfully, the use of low-grade fuel oils will be possible. Problems of kerosene carburetion made up an interesting part of the paper.

To successfully utilize kerosene or other fuel oils in an internal combustion motor, it becomes necessary to deliver the fuel charge to the combustion space, thoroughly



saturated with the fuel molecules, in a correct proportion for all air velocities. It is necessary to effect a thorough saturation of the fuel stream with fuel molecules, maintaining a proper mixture proportion under all operative conditions and deliver it to the manifold for transit.

As kerosene begins to give off a vapor at about 80 degrees Fahrenheit, it follows that the temperature must not fall below this figure at any time, and should be somewhat higher, consistent with volumetric efficiency.

To offset this temperature drop, we may increase the temperature of the incoming air. However, this is not sufficient. As the fuel molecules have a greater specific gravity than air they will be impinged or thrown against the sides of the intake passages and remain in a liquid state. This means an impoverished mixture. This must be avoided, and can be by applying heat to the sides or walls of the manifold. This will materially assist in revaporizing these molecules and sending them back into the air stream.

## Tractor Engines

By W. J. McVicker, General Manager, McVicker Engineering Co.

THE author discusses the elemental principles of the various kinds of tractors which have been experimented with and what the most modern trend of design appears to be following. It is his opinion that the steam tractor will be revived and that it was merely discarded momentarily because of the flurry in favor of gasoline motor construction.

The gas tractor created so much interest that the steam tractor was left in its undeveloped condition and we do not yet know its possibilities. It will not be at all surprising to see a revival in the development of the steam tractor, and it may even become a strong rival of the gas tractor. However, this will depend somewhat on the nature of other fuels available in the near future.

The author discussed different types of engines which had been and are being applied to tractors and set forth the advantages and the disadvantages that had been found in each.

The four-cylinder vertical, which is one of the most popular types, is well balanced mechanically, especially with reference to horizontal movements. It is easy to lubricate and one in which the splash system can be used most satisfactorily. The most serious objection to this type of engine for tractor work is that the bearings are not accessible and the pistons are hard to remove for cleaning and inspection.

There is some question as to whether the valve-in-head motor has an advantage over the other types, such as the L- and T-heads. There appears to be no question that the valve-in-the-head type, due to its more symmetrical combustion chamber and relatively less waterjacket, is the more efficient when the valves are properly adjusted, but as the valve mechanism is more complicated and more liable to get out of adjustment, that fact offsets its other advantages so that in practice there is but little difference in their efficiencies.

In considering the requirements necessary to meet the conditions in power farming, we find that a successful tractor engine must have the following qualifications regardless of its type:

1—It must be so constructed that it can develop its maximum horsepower continuously without self-destruction. The element of limited overload must be eliminated because it cannot be controlled.

2—It must start and operate without undue loss of time and must do a season's work with ordinary care and without the services

of an expert. Instructions that the user must spend considerable time each day in doing expert work in order to keep it going must be discarded from the instruction books, because time is too valuable during that period and such advice will be ignored.

3—It must develop its rated power economically and operate successfully with the kinds of fuel common in the locality where it is used.

## Liquid Fuels, Present and Future

By E. W. Roberts, Managing Editor, Gas Engine

THE author reviews the possibilities in fuels derived from petroleum, shales, liquid fuel from coal, by-product from coke ovens, and alcohol. He presents important data relative to the present and future supply of petroleum and what we may expect in the future in prices and quality.

In this country for some time to come, we will undoubtedly depend on our petroleum resources; that is, our free oils, for liquid fuels, to be used in internal combustion engines. At present, the deposits of oil in sight in known oil lands, is estimated at anywhere from 25 to 40 years' supply at the present rate of consumption. This does not consider oil lands not yet discovered, and therefore we might estimate that at the present rate of consumption, our supply of petroleum is sufficient for the next 50 years. But it must be considered that our consumption of petroleum is increasing rapidly, and therefore the possibilities are that our resources at present are sufficient for about only 25 years to come.

When this source of supply has been exhausted, where shall we turn for our liquid fuels? Our first source of supply will undoubtedly be our shales, of which we have a great abundance. It is undoubtedly known to most of you, that the oil shale industry of Scotland has been in active operation for more than 60 years, with shales having an average yield of about 30 gallons per ton. An investigation of our largest known shale deposits, those of the White River district of Colorado, and Utah, shows that they are nearly equal in yield to those in Scotland.

Another source of liquid fuel is coal. The liquid fuel from coal, may be obtained in three different ways. First, by destructive distillation of the coal itself, such as was used for some time in Scotland, where boghead coal was the source of petroleum, before the beginning of the oil shale industry. Another source is from by-product coke ovens, and still a third, from our gas tars. It is well recognized that our coal resources are so enormous that we may be said to have taken off only a corner from this enormous block of fuel.

## Design and Evolution of Modern Gas Tractors

By W. A. Horthy, B.S., M.E., International Harvester Co.

THE author dwells upon the supposition that gasoline tractors in their present state of development are crude and unsuitable for a variety of working conditions in various localities. He believes that the gas tractor of the future will not be designed in a single model for universal use, but will be specialized for certain conditions.

It is not our purpose to discuss the validity of the arguments pro and con, as to the future of the gas tractor. We consider the statement that the tractor has the greatest industrial possibilities in this country and abroad as unquestionably true.

Among the manifold designs of modern farm tractors it seems futile to discover any

definite trend or similarity toward standardization; always a positive symptom that an industry is still in its experimental stages. There is hardly a successful motor car or gas engine firm today which has not given more or less consideration to the manufacture of tractors. Judging by the result, a rather doubtful success in many instances—we are ready to acknowledge that the problem to solve must be unusually complex.

It is odd to note that roller and ball-bearing construction, which simply revolutionized motor car construction, has found, so far, only conservative appreciation on the hand of tractor designers. The real revolutionizing step in modern tractor transmission design is the introduction of the chain drive.

Against the chain drive stands the argument that a well-designed drive has to be provided with adequate take-up or adjustment. It often occurs that a seemingly well-designed tractor giving entire satisfaction in a certain part of the country meets with failure or a meager success in other places. Of course, various attachments or special features and equipment undoubtedly enlarge the scope of adaptability, but the trouble is that these items increase very rapidly, burdening the specification, shipping and advertising department to such an extent that the necessity of curbing special features grows imperative in order to retain the regular factory routing of mass-production.

## A Standard Drawbar Rating for Tractors

By Raymond Olney, M.E., Editor Power Farming.

THE author draws upon the impracticability of rating tractors on the old basis of drawbar capacity at about one-half the brake or belt rating of the motor and the advertised ability of a tractor to draw a certain number of plows under "average soil conditions."

As far back as 1910, a man connected with one of the leading tractor concerns and prominently identified with the advancement of power farming made a statement in a paper delivered before the American Society of Agricultural Engineers: "One of the greatest needs in one of the greatest fields in agricultural engineering is that of a standard basis for rating farm tractors." In spite of the sound reasoning contained in this statement, the A. S. A. E. has never seen fit to adopt a standard rating.

The present method, which any engineer must admit is unsuited to the purpose, is to rate the drawbar capacity of a tractor at about one-half the brake rating of the motor. This is a relic of the early days of the gas tractor industry. But worse than that, it gives the farm buyer no definite idea as to the actual pulling capacity of the tractor.

I am convinced that the only logical method of rating the pulling ability of tractors is in pounds. Tractor engineers have already discussed this subject to some extent, and this method seems to be gaining support.

For the purpose of illustration I will suppose that a motor is installed in a tractor for which I will assume a gear ratio of 84 to 1, a transmission efficiency of 85 per cent, a drivewheel diameter of 70½ inches, and a total weight of 4,500 pounds.

The torque of the motor and the gear ratio determine the pulling ability of the tractor. The pounds pull at the drawbar is the product of the motor torque, gear ratio and transmission efficiency divided by the radius of the flywheel, less the tractive resistance, which I will assume is 15 per cent in this case. The drawbar horsepower is the product of the pounds pull and the tractive speed divided by a constant and varies directly at the speed.

# American Trucks Barred from United Kingdom

## Only Such Vehicles As Are Requisite for War and That Britain Cannot Furnish May Enter

LONDON, Eng., June 30—Special Marconigram—"Motor truck imports in the United Kingdom have been prohibited except for such vehicles as are quite requisite for the carriage of goods essential to the conduct of the war, and then only if British makers cannot supply the demand."

This action, presumably by the Chancellor of the Exchequer Reginald McKenna culminates a long series of efforts on the part of the British trade to prevent further American competition. Tied up with government orders to such extent that they could not supply private users and later released to some extent for private trade with government contractors, British factories have been unable to supply British business men with motor delivery and haulage equipment. There are now some thirty lines of American trucks represented in England. Recently a number of releases of product for private sale were granted some of the truck firms which have since been withdrawn, so that with the demand for trucks greater than ever before and the home-manufactured product still largely taken up by the government, British business is to be forced by the government to put up with inferior equipment or no equipment at all lest American trucks secure too firm a foothold in the British market.

This action on the part of England tallies very closely with that of France, which has put a ban on all motor vehicles not ordered before May 8. An attempt is being made to exempt trucks from this drastic measure, as was successfully done at the time of the passage of the prohibitive tariff on motor vehicles in England; but the French effort is not apt to prove effective since the government is willing to rent trucks to government contractors as they may be required. They will be able to provide all of the vehicles that will be needed since they can be purchased from America by the government. This will give the government of France complete control of the situation, so that the number of American trucks required to carry on the war will be sufficient and yet American enterprise will be prevented from securing a place in the French market.

The practical removal of these two great nations from the American export field leaves only one country still open to development—Russia. It is not likely that the boycott agreements of the entente will serve to cause Russia to curtail her imports of American trucks, since she can have no other source of supply and sorely needs the vehicles.

Undoubtedly this will release large numbers of trucks for domestic consumption. Already a number of trucks damaged by sea water and otherwise injured in transit have been returned and are being disposed of at bargain prices. Unless the exporting houses who have been handling our foreign business attack the South American, Australian, African and European neutral market with vigor, we may find them dangerous competitors of their own factors and the agents of these factors.

### FRONT-DRIVE EIGHT PRODUCED

Los Angeles, Cal., June 28—The Homer Laughlin Engineers Corp. has completed three of the new Homer Laughlin eight-cylinder front-driven cars and the factory is now turning out ten machines on order.

The new car has been more than 2 years in the rough and now that the factory officials are sure of their product, active car building is to follow. The car weighs less than 1,700 pounds and sells for \$1,050. The builder has taken over the factory formerly occupied by the McCann Mechanical Works and is building every part of

the car with the exception of the electrical equipment, wire wheels and tires.

### ENGLAND AGAIN CURBS MOTORISTS

London, June 25—The Government has decided that more effective diminution in the use of cars can be obtained by control than by increasing taxes. According to an announcement made in the House of Commons today, the increased taxes are to be rescinded and a central authority created with power to grant permits for the purchase of specified amounts of gasoline, on which a license of 6 pence—12 cents—per gal. must be paid at the time of purchase.

### DIXIE HIGHWAY PROGRESSING

Louisville, Ky., June 30—The last barrier to the construction of the Dixie highway between Nashville and Chattanooga, Tenn., along the originally designated route has been removed, and there is nothing now in the way for the speedy construction of this important link in the highway. Both Hamilton and Marion counties have agreed to use 100 convicts each and the work will start in 10 days' time. The highways will be rushed through to an early completion.

The commissioners of Marion county had previously awarded the contract for the construction of the Battle Creek section of the highway from the Sequatchie Valley to the top of the mountain.

With the highway built through Hamilton and Marion counties, a through road passable the year around will be assured. This is the last barrier to through travel to be removed from Michigan to Florida. The other counties on the stretch of road are now at work and it is safe to say this link of the road will be passable by fall and will be completed in 8 to 12 months.

### APPROPRIATION FOR YELLOWSTONE

Aberdeen, S. D., June 30—The government bill contains an item of \$5,000 for the benefit of the Yellowstone trail, to assist in improving that transcontinental highway across the Standing Rock Indian reservation in South Dakota. This item is there because of the recognized value of the Yellowstone trail as a transcontinental road, and the moneys that counties and states and individuals are putting into the improvement of the road. The government feels that it is only fair to meet this endeavor half way across that property which is particularly under government charge.

This appropriation was secured through the work of Congressman Royal C. Johnson, of South Dakota, who interested the Indian committee in the matter.

## Racing Events

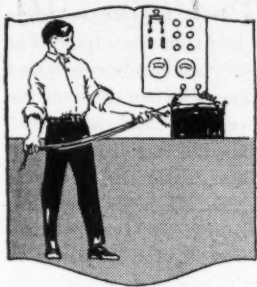
- \*July 8—100-mile track meet, Grand Rapids, Mich.
- \*July 15—Omaha, Neb., speedway race.
- July 15—Track meet, Newark, N. J.
- July 15—Track meet, North Yakima, Wash.
- \*July 16—Track meet, Portland, Ore.
- July 16—100-mile track meet, Burlington, Ia.
- \*July 20—Hill climb, Uniontown, Pa.
- \*July 22—Kansas City speedway race.
- \*July 22—Hill climb, Oriskany Falls, N. Y.
- July 29—Track meet, Newark, N. J.
- \*August 5—Tacoma, Washington, speedway races.
- August 17—Track meet, Boise, Ida.
- \*August 19—Elgin road race.
- August 26—100-mile track meet, Kalamazoo, Mich.
- \*September 1—2—24-hour race, Sheepshead Bay.
- September 4—Track meet, Newark, N. J.
- \*September 4—Speedway race, Cincinnati, Ohio.
- September 4—Track meet, Elmira, N. Y.
- September 4—Des Moines, Ia., speedway race.
- September 4—5—Track meet, Spokane, Wash.
- \*September 4—Cincinnati speedway race.
- September 9—Indianapolis speedway race.
- September 16—Speedway race, Providence, R. I.
- September 18—Track meet, North Yakima, Wash.
- September 29—Track meet, Trenton, N. J.
- September 30—New York, Sheepshead Bay speedway race.
- October 7—Philadelphia speedway race.
- October 7—Omaha speedway race.
- October 14—Chicago speedway race.
- October 19—Indianapolis speedway race.
- October 21—Track meet, Kalamazoo, Mich.
- \*November 16—Vanderbilt cup race, Santa Monica, Cal.
- November 18—Grand Prize race, Santa Monica, Cal.
- November 30—Speedway, Los Angeles, Cal.
- December 25—Speedway, Los Angeles, Cal.

\*Sanctioned by A. A. A.

### SHOWS

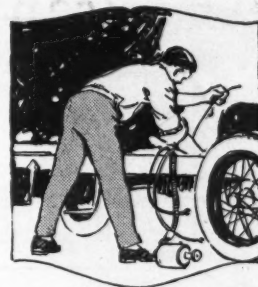
January 6-13—New York show.  
January 27-February 3—Chicago show.





# Electrical Equipment of the Motor Car

By David Penn Moreton & Darwin S. Hatch.



*Editor's Note*—Herewith is presented the second installment of a weekly series of articles which began in *Motor Age*, issue of June 29, designed to give the motorist the knowledge necessary to enable him to care for and repair any and all of the electrical features of his car, no matter what make or model it may be. The information it is planned to offer in this series will be equally valuable to the repairman, whether he be skilled in things electrical or have a very limited acquaintance with them. For the sake of the majority of readers, whose real knowledge of electricity is more general than definite, it has been thought wise to begin with the very first principles of electrical phenomena, in order that owners may be able to follow the circuits on the electrical systems of their cars with the certainty that they are right. To the lay reader, the first few installments of this series are the most important, for without them, wiring diagrams, trouble charts and repairing instructions are almost useless; with the groundwork well laid by study of the early portion of the series, the reader will be able to think electrically, and a tangle of wire under a car or a tangle of lines on a wiring diagram will become clear.

The first element in the thorough understanding of electrical apparatus is the idea of the circuit. At the conclusion of this series, "Electrical Equipment of the Motor Car," with additions, will be published in book form by the Class Journal Co., Chicago, in a size to fit the pocket conveniently.

## WHAT HAS GONE BEFORE

In preceding installment of this series which appears weekly, beginning in the issue of *Motor Age* for June 29, the principle of the electric circuit was brought out. The circuit is the basis of the many applications of electricity to the motor car, and, in order to understand the operation and maintenance of these applications, it is essential that we have a thorough knowledge of the electrical circuit and its more common characteristics. In developing the idea of the electrical circuit its analogy to water systems is used. In electrical installations the circuit must be complete for a current of electricity to flow, and the path of the current is without beginning or end like a circle is without beginning or end. The relations of current, pressure and resistance in a simple circuit are developed.

## Part II—The Series Circuit

IF a water circuit be composed of two pipes and they are connected in the manner indicated at A and B in Fig. 11, they are said to be connected in series. There is only one path through which the water may flow in passing from the outlet of the pump and return to the pump. The current of water at any instant is the same at every point along the two pipes, and just exactly as much water is returning to the pump in a given time as is leaving the pump. The water is not used up in the operation of such a circuit. The circuit is complete and, as in the case of the circle, has neither beginning nor end. Note that the water is not used up in this operation, but some of its ability to do work is used.

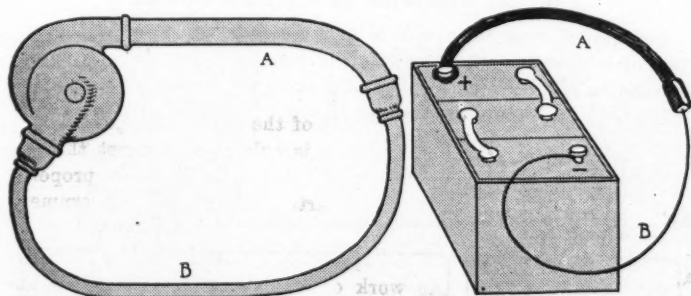
An electrical circuit composed of two or more different wires of perhaps different sizes, lengths and materials, and connected as shown in Fig. 12 is called a series circuit. In this case, there is only one path through which the electricity may flow in passing from the positive terminal of the battery and return to the negative terminal of the battery. The current of electricity is the same at every point

along the different wires, and just exactly as much electricity is returning to the battery in a given time as is leaving the battery in the same time.

The electricity is not used up in the operation of such a circuit, but its ability to do work is used, just as in the case of the water. This will be explained more in detail in later installments of series.

A series water circuit is found in the operation of the cooling system of some early motor car engines, as shown in Fig. 13. In this case, the four waterjackets of the different cylinders, the radiator, the pump and the connecting pipes are all in series. The current of water through the different parts of the circuit at any time is exactly the same; just as much water returns to the pump as the pump sends into the circuit. This method of cooling is not a good one, but is used here for the purpose of bearing out the series circuit idea.

When the headlights on motor cars are connected as shown in Fig. 14, they form a typical series electrical circuit. The current of electricity through the different parts of the circuit at any time is



Figs. 11 and 12—A series electrical circuit and a series water circuit compared. These are called series circuits because there is only one path in which the current may flow

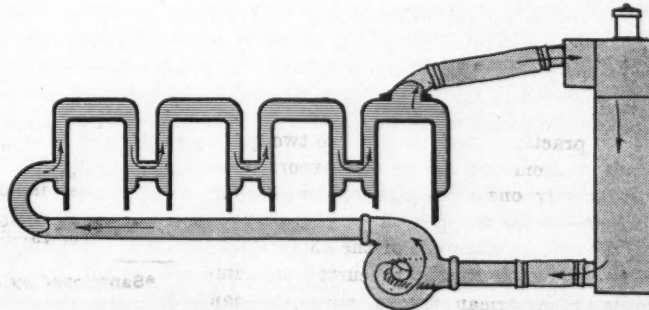


Fig. 13—A series water circuit as employed on some early cars. The pump, pipes, water jackets and radiator are in series, for the water has only one path in which to flow

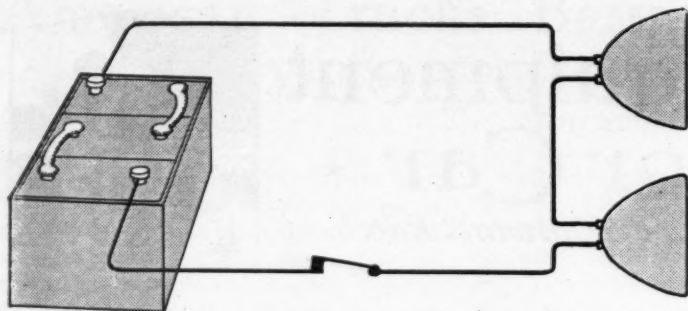


Fig. 14—A series electric lighting circuit. The battery, switch wires and lamps are in series, for the current has only one path in which to flow

exactly the same; just as much electricity returns to the battery as the battery sends into the circuit. The electricity is not consumed in the lamps, but some of its ability to light lamps is used.

### Resistance of Series Circuit

Since the resistance offered by a pipe to the free flow of water through it increases with an increase in the length of the pipe, it is evident that the resistance of two pipes connected in series will be greater than the resistance of either pipe alone. If the two pipes are of exactly the same size and length, they will, when connected in series, offer twice the resistance to the flow of water through them that is offered by a single pipe. If the pipes are of the same size but of different lengths, they will offer a combined resistance equal to that of a single pipe of the same size but having a length equal to that of the combined lengths of the two pipes.

Two wires of the same size and material will, when connected in series, offer a combined resistance equal to that of a single wire of the same size, but having a length equal to the combined lengths of the two wires.

Any number of electrical resistances, such as motor car lamps, connected in series might be thought of as being equivalent to a number of wires of the same size and material but having different lengths, and the combined resistance of any number of resistances in series is equal to the sum of the different resistances. For example, if the two lamps in Fig. 14 each have a resistance of 2 ohms, the combination will have a total resistance of 4 ohms. In order to get the total resistance of the circuit, the resistance of the leads, switch, etc., should be added to the resistance of the lamps.

### Pressure Relations for a Series Circuit

If pressure gauges be connected along a water pipe, as indicated in Fig. 15, in which there is a current of water, the difference in the readings of the different gauges will bear the same relation to each other as exists between the distances between the points to which the gauges are connected. For example, the difference in the reading of gauges G1 and G2 will bear the same relation to the difference in the readings of gauges G2 and G3, as the distance between G1 and G2 bears to the distance between G2 and G3. If the distance between G2 and G3, which we will represent by  $L_2$  is twice the distance between G1 and G2, which we will represent by  $L_1$ , then the difference in readings of G2 and G3 will be twice the difference in the readings of G1 and G2.

The reason for this relation may be explained as follows: Since the resistance between the points where G2 and G3 are connected will be as many times the resistance between the points where G1 and G2 are connected as the length  $L_2$  is times the length  $L_1$ , the pressure between the points where G2 and G3 are connected must be as many

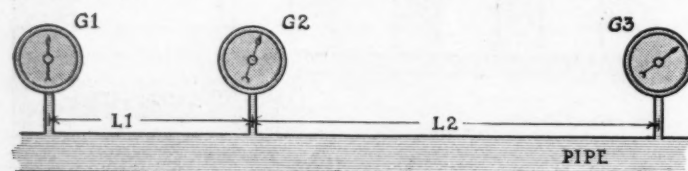


Fig. 15—The difference in pressure along a water circuit is proportional to the length of the pipe

times the pressure between the points G1 and G2 are connected as  $L_2$  is times  $L_1$ , in order to produce the current in the pipe. The differences in pressure between different points along a series water circuit will bear the same relation to each other as exists between the resistances between the points where the pressures were measured.

In the electrical circuit, the voltmeter measures the difference in pressure between the points along the circuit to which the terminals of the voltmeter are connected. Thus in Fig. 16 there are two voltmeters connected so as to measure the difference in pressure between two different sets of points. If the wire composing the circuit is of the same material and same size all the way along the circuit, then the reading of the two voltmeters V1 and V2 will bear the same relation to each other as exists between the lengths  $L_1$  and  $L_2$ . If the length  $L_2$  is twice the length  $L_1$ , then the resistance  $R_2$  is twice the resistance  $R_1$ , and since the value of the current in  $R_2$  is exactly the same as the value of the current in  $R_1$ —neglecting the current through the voltmeters—there will be twice as much pressure required to produce this current in  $R_2$  as is required to produce it in  $R_1$ , which will result in the reading of V2 being twice the reading of V1. When the resistance  $R_2$  is three times the resistance  $R_1$ , then the reading of V2 will be three times the reading of V1 etc.

The electrical pressure acting on a part of the resistance of a series circuit, bears the same relation to the pressure acting on some other part of the same circuit as exists between the resistance of the two parts. That is, if two resistances are connected in series and they have exactly the same resistance, then the pressure acting on each of them will be exactly the same when there is a current of the same value through them. If, however, two resistances are connected in series and the resistance of one is twice that of the other, then the pressure acting on the one of lower resistance will be one-half of the pressure acting on the one of higher resistance.

### Resistances for Lamps

If two lamps having different resistances be connected in series, the pressure acting on one lamp will not be the same as the pressure acting on the other lamp. The lamp of higher resistance will have a higher pressure acting on it than the one of lower resistance. This relation accounts for the fact that two lamps of different candlepower and the same voltage will not operate satisfactorily in series, because the one of lower candlepower, or higher resistance, will have a larger part of the total pressure acting on it than the one of high candlepower, or lower resistance. Thus you cannot put a 6-volt, 24-candlepower, headlight in series with a 6-volt, 2-candlepower dashlight, and operate them from a 12-volt battery, but you can put two 6-volt, 24-candlepower headlights or in series with a 12-volt battery, or one 6-volt 2-candlepower dashlight and one 6-volt 2 candlepower taillight in series with a 12-volt battery.

A 6-volt lamp may be operated on a 12-volt battery by connecting a resistance in series with the 6-volt lamp as shown in Fig. 17. The resistance in series with the lamp must be equal to the resistance of the lamp, in order that the pressure over the lamp be 6 volts or one-half of the total pressure. The pressure over the lamp may be decreased by connecting more resistance in series, or increased by decreasing the amount of resistance in series. This principle is used by some companies in dimming the headlights, as the decrease in pressure on the lamp decreases its candlepower.

### Current Relations in a Series Circuit

The reader must always have in mind that the current in every part of a series circuit is exactly the same and that there is no accumulation of electricity at any point along the circuit. An ammeter connected at any point in a series circuit will indicate the same cur-

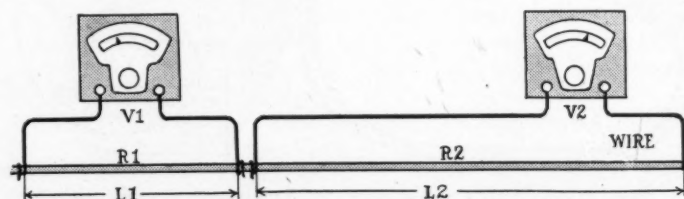


Fig. 16—The difference in pressure along an electrical circuit is proportional to the length of the wire



rent as long as there is no change in the value of the resistance of the circuit or the total pressure acting in the circuit.

If a series circuit be opened at any point by means of a switch, if a lamp burns out or a wire breaks, there will be no current in the circuit and an ammeter connected in the circuit will indicate zero current regardless of where the ammeter may be connected.

The current in a circuit, in amperes, is usually represented by the capital letter I, the pressure in volts by the capital letter E, and the resistance in ohms by the capital letter R.

A certain 6-volt headlight takes a current of 4 amperes when it is connected to a pressure of 6 volts. What resistance must be placed in series with the lamp in order to operate it from a 12-volt battery? Since the pressure necessary to operate the lamp is one-half of the total pressure in this case, then the resistance required in series with the lamp will be equal to the resistance of the lamp. The resistance of the lamp, which we will represent by RL, will be equal to the pressure required to operate it divided by the current the lamp takes, or

$$RL = \frac{6}{4} = 1\frac{1}{2} \text{ ohms}$$

Therefore the resistance that must be placed in the circuit is  $1\frac{1}{2}$  ohms.

If this same 6-volt lamp is to be operated on a 24-volt battery, the procedure in determining the value of the resistance to be placed in circuit is a little different. The resistance and the lamp will carry the same current, since they are in series. The pressure over the resistance which we will represent by ER will be equal to the total pressure, E, of the battery, minus the pressure over the lamp EL or

$$\begin{aligned} ER &= E - EL \\ ER &= 24 - 6 \\ ER &= 18 \text{ volts} \end{aligned}$$

The value of the resistance then is equal to the pressure acting on the resistance divided by the current through the resistance, or

$$R = 18 \text{ divided by } 4 = 4\frac{1}{2} \text{ ohms}$$

The resistance of the lamp, if it takes a current of two amperes, is equal to

$$6 \text{ divided by } 4 = 1\frac{1}{2} \text{ ohms}$$

It is interesting to note that in each of the above cases, the relation between the resistance of the lamp and the resistance to be connected in series with it is the same as the relation between the pressure acting on the lamp and the pressure acting on the resistance in series with the lamp.

Since the lamp requires a pressure of 6 volts, the pressure acting on the resistance to be placed in series will be the difference between the total pressure, or 24 volts, and the pressure acting on the lamp, or 6 volts, which gives 18 volts. The resistance that must be placed in series with the lamp will be equal to as many times the lamp resistance as the pressure which is to act on the series resistance is times the pressure acting on the lamp. The pressure acting on the series resistance in this case is three times that acting on the lamp, hence, the value of the series resistance must be three times the value of the resistance of the lamp. The resistance of the lamp is equal to the pressure on it divided by the current through it, or 6 divided

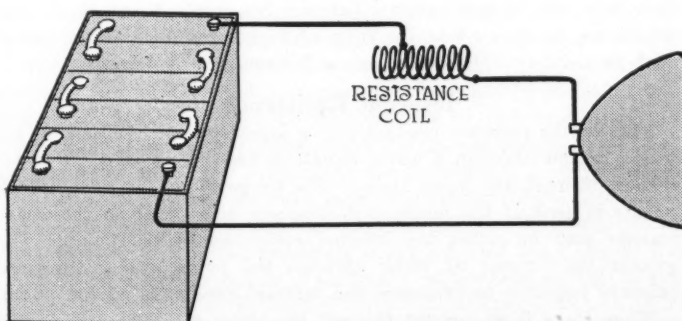


Fig. 17—Using a 6-volt lamp with a 12-volt battery by putting a resistance in series

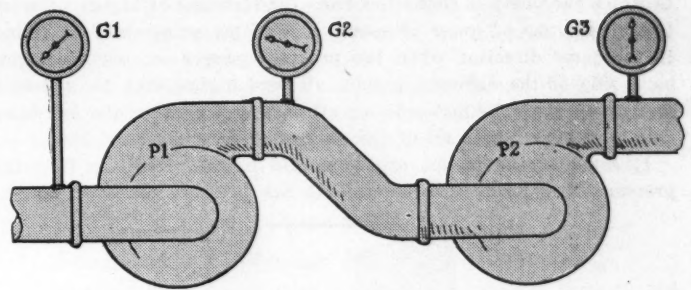


Fig. 18—Boosting the pressure in a water circuit by putting pumps in series

by 4, or  $1\frac{1}{2}$  ohms. Hence, the value of the series resistance will be equal to 3 times  $1\frac{1}{2}$  or  $4\frac{1}{2}$  ohms.

### Pressures in Series

If two pumps be connected as shown in Fig. 18, the pressure produced by one pump will act with the pressure produced by the other pump and the combined pressures of the two pumps will act upon the water circuit to which the combination is connected. Several pumps may be connected in this manner and the sum of the pressures produced by the combination, when they are producing a pressure in the same direction around the circuit, will be equal to the total pressure acting in the circuit. Thus, if each of the pumps indicated in Fig. 18 is producing a pressure of 50 pounds, the total pressure acting in the circuit to which the pumps are connected will be equal to the sum of two pressures or 100 pounds.

If the pressures produced by the pumps are unequal, the total pressure is equal to the sum of the pressures, just the same. For example, if the pumps are producing pressures of 75 and 25 pounds per square inch, respectively, the total pressure acting on the circuit to which they are connected will be equal to 75 plus 25 or 100 pounds per square inch. If two men shove against a car in the same direction with a force of 100 and 125 pounds, the total force acting on the car is equal to the sum of the two forces or 225 pounds.

Several electrical pressures may be connected in a similar manner to the pumps, as indicated in Fig. 19, which represents two dry cells in series. If the pressure produced by each of the dry cells acts in the same direction, then the total pressure will be equal to the sum of the pressures of the two cells, regardless of whether the pressures produced by the cells are equal or unequal in value. Thus, if the pressures produced by the two dry cells are 1.2 and 1.4 volts, respectively, the total pressure will be equal to 1.2 plus 1.4 or 2.6 volts.

If a number of equal pressures be connected in series so they all act in the same direction around the circuit, then the total pressure will be equal to the product of the number of pressures connected together and the value of one of the pressures. For example, if six dry cells, each producing a pressure of 1.5 volts, be connected series, then the total pressure will be equal to six times 1.5 or 9 volts. If ten men are all pushing on a car in the same direction and each is pushing with the same force, say 100 pounds, then the total force acting on the car will be equal to ten times the force of a single man, or 1,000 pounds.

In order that the pressures produced by the pumps act in the same direction around a water circuit, it is necessary to connect the sides of the pumps of lower pressure to the sides of higher pressure in regular order. If pressure gauges be connected to the circuit as indicated in Fig. 18, it is possible to determine the pressure produced by either of the pumps or any combination by observing the indications of the proper gauges.

For example, the pressure produced by the pump P1 is equal to the difference in the pressure before and beyond the pump, which may be determined by reading the gauges G1 and G2 and then subtracting the lower reading from the higher reading. The pressure produced by the pump P2 may, in a similar manner, be determined by taking the difference in the readings of the gauges G2 and G3. The pressure produced by each pump tends to cause the water to flow through the pump itself from the terminal of lower pressure toward the terminal of higher pressure, and through the water circuit

to which the pump is connected from the terminal of higher pressure toward the one of lower pressure. All of the pumps will be acting in the same direction when the pressure gauges on, say the right-hand side of the different pumps, all read higher than the pressure gauges on the left-hand side, or all of the gauges on the left-hand side read higher than all of the gauges on the right-hand side.

If some of the pumps are connected in the circuit so that the pressure they produce is opposed to the pressure produced by the

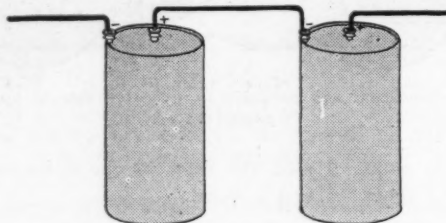


Fig. 19—Boosting the pressure in an electrical circuit by connecting dry cells in series

other pumps, then the pressure acting in the circuit will be equal to the difference between the sum of the pressures acting in one direction and the sum of the pressures acting in the other direction. If the sum of the pressures acting in one direction is exactly equal to the sum of the pressures acting in the opposite direction, then the pressure acting in the circuit tending to produce a flow of water will be equal to zero.

The direction of the pressure acting in the circuit when there are pressures in both directions, will correspond to the larger sum. For example, if six pumps are connected in such a manner that the pressure produced by two of them is in the opposite direction to the pressure produced by the remaining four, it is obvious that the pressure acting in the circuit to which the pumps may be connected is not equal to the sum of the pressures produced by all six pumps, but it is equal to the difference in the sum of the pressures produced by the four pumps and the sum of the pressures produced by the two pumps.

If each of the six pumps is producing a pressure of 10 pounds, the pressure acting in the circuit may be determined as follows: The pressure produced by the four pumps will be equal to the pressure produced by a single pump multiplied by four, or  $10 \times 4$ , or 40 pounds. The pressure produced by the two pumps likewise is equal to  $10 \times 2$ , or 20 pounds.

### Direction of Pressure

The pressure acting in the circuit is equal to the pressure in one direction subtracted from the pressure in the opposite direction, or  $40 - 20 = 20$  pounds. The direction of this pressure of 20 pounds will be the same as the direction of the larger sum of 40 pounds. The same results could be accomplished by using two pumps alone instead of six, as the pressure of two of the six pumps which are acting in one direction is exactly neutralized by the pressure of two of the six pumps acting in the opposite direction.

It is obvious that if ten men are pushing on a car—say, six in a certain direction and four in an exactly opposite direction—that the force tending to move the car is not equal to the combined forces produced by the ten men but it is equal to the force produced by the six men minus the force produced by the four men or  $600 - 400 = 200$  pounds. The direction of this resultant force corresponds to the direction in which the six men are pushing.

In order that the electrical pressures produced by several batteries may act in the same direction around the electrical circuit, it is necessary that the terminal of lower electrical pressure of one battery be connected to the terminal of higher pressure of the next battery; that is, that the negative terminal of one battery be connected to the positive terminal of the next one. The pressure produced by the battery causes the electricity to pass through the battery itself from the terminal of lower pressure, or negative terminal, toward the terminal of higher pressure, or positive terminal, while in the part of the electrical circuit outside of the battery it causes the electricity to pass from the terminal of higher pressure toward the terminal of lower pressure.

The action of a generator is exactly the same as the battery, inasmuch as the current is from the negative to the positive terminal within the generator and from the positive to the negative terminal through the circuit outside the generator. If several electrical pressures be connected in series in such a manner that part of them are acting in one direction around the electrical circuit and the remainder in the opposite direction, the total pressure acting in the circuit will not be equal to the sum of all the different pressures, but it will be equal to the difference in the sums of the pressures acting in the opposite directions.

The difference in the sum of the pressures acting in the two directions around the circuit is called the *effective pressure* and the direction of the effective pressure will correspond to the direction of the larger sum of pressures. For example, if six dry cells each producing a pressure of 1.5 volts, are connected in series, but the pressure produced by two of them is in the opposite direction to the pressure produced by the remaining four cells, then the effective pressure in the circuit will be equal to the pressure produced by the four cells, or 6 volts, minus the pressure produced by the two cells, or 3 volts, which gives 3 volts. The same effective pressure could be produced by two cells acting alone, as the pressure produced by two of the six cells acting in one direction is exactly counteracted by the pressure of two of the six cells acting in the opposite direction.

### Arrangement of the Parts of a Series Circuit

The order in which the various parts of a series circuit are arranged has nothing to do with the operation of the circuit. The pressures may be connected together at one point and the resistances all connected directly together, or the pressures may be distributed around the circuit by connecting the resistances between the different pressures. The effective pressure acting in the series circuit is independent of the location of the various pressures in the circuit and, likewise, the total resistance of the circuit is independent of the location of the different resistances forming the circuit. Two 6-volt lamps and two 6-volt batteries may be connected in series as shown in Fig. 20 or they may be connected as shown in Fig. 21 and the results are exactly the same.

If a voltmeter be connected between the points A and B in Figs. 20 and 21 there will be no indication of pressure between the two points and so far as the operation of the circuit is concerned they may be connected together. The reason for there being no difference in pressure between the points A and B is as follows: The same part of the total pressure is used in operating each of the lamps, since they are supposed to have the same resistance, and, since the pressure produced by each of the batteries is the same, we can think of one of the batteries as producing the current in one of the lamps and the other battery as producing the current in the other lamp.

If the lamps were of unequal resistance, in Figs. 20 and 21, and the pressures produced by the batteries were the same, there would be a difference in pressure between the points A and B; or, if the resistances of the lamps were the same and the pressures produced by the batteries were unequal, there would be a difference in pressure between the points A and B. If, however, the resistances of the lamps are unequal and the pressures produced by the batteries are also unequal, but the relation between the resistances is the same as the relation between the pressures produced by the batteries, then there will be zero pressure between the points A and B, if these points are so chosen that the lamp of higher resistance is in circuit with the battery of higher pressure between the two points.

### Internal Resistance

Part of the pressure produced by a pump, when it is causing the water to flow through a water circuit is used in causing the water to flow through the pump itself. The property of the pump which results in part of the pressure it produces being used in the above manner may be called the internal resistance of the pump. The greater the current of water through the pump, the greater the pressure required to overcome the internal resistance of the pump.

When there is no current through the pump the difference in the pressure indicated by two gauges connected to the terminals of the pumps will represent the total pressure produced by the pump. The



part of this total pressure which is available to act on the external circuit and produces a current will depend upon how much of it is used within the pump itself. It is obvious that the pressure between the terminals of the pump when there is a certain current through it will be greater for a low internal resistance than for a high internal resistance. Hence, it is desirable to have the internal resistance of the pump as low as possible in order that just as much of the pressure it produces be available at the terminals of the pump. The pressure between the terminals of the pump will change as the current through the pump changes even though the total pressure produced by the pump remains constant. The larger the current through the pump the lower the difference between the terminal pressures.

All of the pressure produced by the battery or generator is not available at the terminals, as a part of the pressure is used in causing the electricity to flow through generator or battery. The opposition offered by the generator or battery to the flow of electricity through it is called the *internal resistance*. The action of the internal resistance of the generator or battery is exactly the same as the internal resistance of the pump. It results in the pressure between the terminals of the generator or battery decreasing as the value of the current through them increases, assuming the total pressure generated remains practically constant. A few simple examples will perhaps give the reader a better understanding of the effect of this internal resistance upon the operation of the electrical circuit.

### Internal Resistance of Battery

The total pressure generated in a certain storage battery is 6.8 volts and the internal resistance of the battery is .04 ohm. What will be the pressure between the terminals of the battery when the battery is supplying a current of 20 amperes?

The pressure required to produce a current of 20 amperes through a resistance of .04 ohms is equal to the product of the current and the resistance,  $.04 \times 20$ , or .8 volt. The pressure available at the terminals of the battery will be equal to the total pressure minus the pressure required to produce the current through the internal resistance, or 6.8 minus .8, or 6 volts.

If several batteries similar to the above be connected in series so that their pressures are all acting in the same direction around the circuit there will be a decrease in the value of the pressure between the terminals of each of the batteries as the current in the circuit increases in value. The decrease in pressure of the different batteries will be the same provided their internal resistances are equal in value. If the internal resistance of the different batteries are not equal, there will be a greater decrease in the value of the pressure between the terminals of the batteries of larger internal resistance than between the terminals of the batteries of lower internal resistance.

It may happen that the internal resistance of one or more of the batteries is such that the pressure required to cause the electricity to flow through its internal resistance is greater than the pressure produced by that particular battery, which results in a part of the pressure produced by some other battery of lower internal resistance being used to cause the electricity to flow through the battery of higher internal resistance.

This state of affairs may exist in a circuit composed of a number of dry cells connected in series. The pressure produced by each of the dry cells may be the same when measured by means of a voltmeter and there is no current through them except that required to operate the voltmeter. If a current be taken from each of the cells, it will be observed that there is a decrease in the voltmeter reading due to a part of the total pressure being used within the cell. The internal resistance of some of the cells may be such that it will be impossible to get a very large current from the cells even if their terminals be connected directly to the ammeter. A cell of high internal resistance may do more harm in a circuit than it does good.

For example, when the pressure required to cause the electricity to flow through the internal resistance is greater than the pressure the cell is producing, the cell is a hindrance rather than an aid to the

operation of the circuit. All of the cells may help in producing the current, when the value of the current is small, but with an increase in current some of the cells may prove to be worthless or a hindrance to the operation of the circuit.

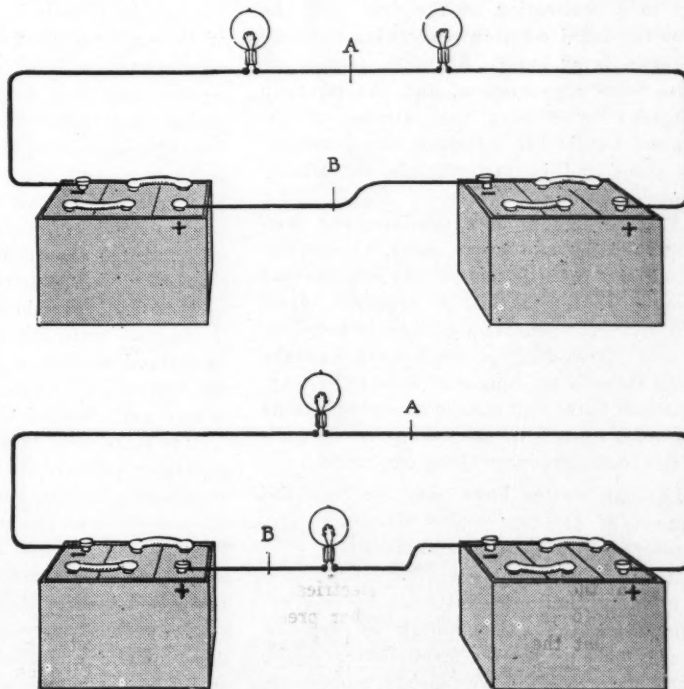
The above discussion leads to the conclusion that the condition of a cell cannot be determined by measuring its pressure alone, but the ability of the cell to deliver current or the decrease in pressure between its terminals with an increased in current must be determined. A more detailed discussion of the internal resistance of a cell will be given in the section on batteries.

### Calculating Resistance for Battery Charging

A storage battery is charged by sending a current through the battery from the positive to the negative terminal or just opposite to the direction in which the pressure of the storage battery acts. The pressure producing the current must be ample to overcome the pressure of the storage battery and in addition to produce the required current through the resistance of the connecting leads and the internal resistance of the battery. In some cases the pressure producing the current is varied in value in order to produce the required current, while in some cases the pressure of the source from which the charging current is derived remains constant and the resistance of the circuit is adjusted so as to give the proper current.

For example, what resistance must be connected in circuit, if it is desired to send 4 amperes through a 6-volt battery when it is connected to a 110-volt circuit? If the pressure produced by the battery is exactly 6 volts and the pressure of the circuit to which the battery is connected is 110 volts, then the effective pressure is equal to 110 minus 6, or 104 volts. This effective pressure of 104 volts is to produce a current of 4 amperes, therefore the resistance of the circuit must be equal to 104 divided by 4, or 26 ohms. This resistance of 26 ohms represents the total resistance of the circuit. If the pressure of the battery increases, the current in the circuit will decrease as the effective pressure will be less. In order to maintain the current constant in value, as the value of the effective pressure decreases, it will be necessary to decrease the resistance of the circuit.

If several batteries be connected in series, the effective pressure will be less than in the case of a single battery, and hence less resistance will be required in order that the current be the same in both cases. Details for charging storage batteries will be given in the section on batteries.



Figs. 20 and 21—Two methods of connecting lamps and batteries in series

# Marked Roads and What They Mean to the Motorist

## Practice of Labeling Highways of Great Importance— What Illinois Is Doing for the Tourist

By F. T. Sheets

Illinois State Highway Dept.

A FEW years ago such a thing as a route definitely named and marked for the guidance of the traveling public was unknown. Roads were known locally, and were considered only from the local standpoint. The possibility of a road having a relation to other states or to the country at large was not realized. Consequently the conditions of the roads in various communities have depended upon the enterprise and progressiveness of those communities alone. Since the era of the motor car with the attending promotion of marked through routes, a great impetus has been given to the improved roads movement. The organized interests of the through route associations have assisted isolated communities and have induced them to improve their roads. This has resulted in definite action being taken by each individual locality in such a manner as to carry out one general policy as outlined by the association promoting the route.

### Marked Routes Result of Co-operation

Practically all of the marked routes have been financed and promoted by perfected organizations of interested men and women. Men of national reputation, together with the most humble person along the route, have been closely identified with this movement. The combination of the efforts of all the interested people between these two extremes has resulted in a movement which has awakened the whole country to a realization of the fact that the time for definite action concerning the road problem is at hand. Strength always results from organization, and the strength obtained by uniting the interest of the general public far surpasses any possessed by state and county officials or isolated road legislation.

A large amount of enthusiasm has been displayed by motor car users. From the standpoint of the motor car tourist the through routes marked at frequent intervals by some conspicuous sign is very desirable. Traveling is much more pleasant when there is no danger of losing the way. Likewise hotel and garage accommodations are much better for the tourist if the bulk of the traffic proceeds along one route.

Through routes have also received the support of the motor car manufacturers. Aside from the general standpoint of public welfare, such producers have been able to advance their own interests by co-operating with the various highway associations. Through routes mean better roads, better roads mean more tourists, more tourists mean more motor cars, more motor cars mean more business.

The results obtained by such important organizations as the Dixie Highway asso-

ciation, Lincoln Highway association or the National Highway association, far surpass the expectations of even the most optimistic promoters. The roads have been dragged and graded, permanent culverts and bridges built, and in many places the roads have been improved with some form of hard-wearing surface. Local officials have co-operated with the promoters of these highways so that a large part of the money spent locally has been used on these routes. Naturally this has hastened the improvement far beyond the rate which would have prevailed if hit-or-miss methods were followed.

The marking signs used so far on the through routes have consisted largely of various colored bands and symbols painted on telephone poles or other roadside structures. This system of marking might be generally improved in the future if some more permanent marker were used. This idea might be carried out as the route became constructed of the more permanent types of pavement. In this manner the improved stretches might be honored by the more permanent marking system while the unimproved portions would be simply designated by blazing a trail of colors on the telephone poles.

### How It Is Done in Illinois

The fundamental purpose of the state aid law in Illinois is to obtain a network of through roads. The policy of the state administration, the state highway commission and the chief state highway engineer has been to bend every effort toward a state-wide system of roads, which will serve local, state and through traffic. The influence of the department has been used in all cases to secure the type of road which suited the traffic conditions, and to require proper construction and maintenance of the types chosen. All matters pertaining to state aid roads have been administered in such a manner as to benefit the system as a whole rather than to cater to any narrow local prejudices.

It is plain that this policy has met with popular approval. This approval has been manifested by the formation of the various associations promoting through routes. These promoters are demanding in an unofficial way the same through system as is advocated by the state law and the state highway department. The co-operation of these official and unofficial interests naturally proves beneficial to the road system.

The state highway department is heartily in sympathy with the movement to establish marked through routes because in this manner the cause of better roads is

served. In order to assist this movement, a map has been prepared by the department showing the through routes established up to date. It is believed that proper publicity may be given these routes in this matter and that their importance may be more apparent if official recognition is given. Page 31 shows the map of marked through routes in the state. There may be some small errors in the minor routes, and in some cases incomplete information prohibited showing a route in full. The information shown, however, is believed to be correct. A glance at this map shows the magnitude of the work which has been done in Illinois alone.

The through routes closely follow the state aid routes. As a general rule it may be said that the state-aid roads which follow the through routes are the most important ones. In addition to local traffic they accommodate fast moving traffic which might be compared to that carried by the main passenger lines on a railroad. The remaining state-aid roads may well be compared to the spur lines which carry local passenger traffic and freight. In designing the state-aid system this fact should be taken into account, and a width and type chosen which will best accommodate the conditions. In general the state-aid roads which serve through traffic as well as local traffic should be constructed first. The types and width chosen for through roads should be such as will carry fast moving motor car traffic. By handling this work in the manner outlined the purpose of both state-aid roads and through routes will have been fulfilled.

It is to be hoped that the extensive plans which the various through highway associations have under way will be carried to a successful conclusion, and that the praiseworthy effort of these organizations will be strengthened and honored by the support of the public at large.

### OZARK TRAILS MEETING

St. Louis, Mo., June 30—More than 3,000 delegates representing business organizations, municipalities and townships and motor clubs attended the Ozark Trails Association fifth annual convention at Springfield, Mo., Monday, Tuesday and Wednesday of this week. Most of the delegates went to Springfield in machines and more than 1,000 cars were in the convention parade. The most notable feature of the convention was the widespread demand for extensions of the road system encouraged by the association.

A general program has been adopted that will provide splendid connecting roads, centering about Springfield, reaching to St. Louis, Kansas City, Wichita,



*Map of the marked roads in the state of Illinois*

# Inspection Party Finds Jackson Highway a Real Road



*Scottsville and Allen county, Ky., give party a real reception at county line*

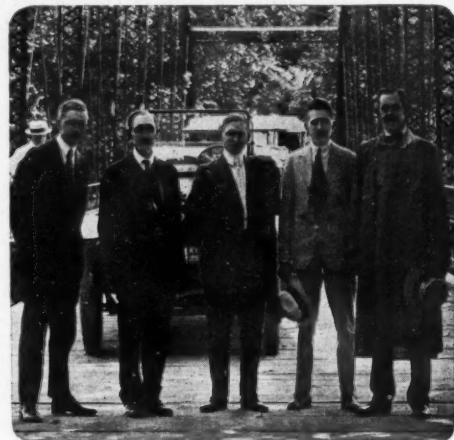
## Only Few Miles That Are Rough, and These Will Be Repaired This Summer

By William K. Gibbs

**F**OOTHILLS of the Cumberlands and a part of Tennessee that immediately surrounds Nashville spread fanlike before me, and as I sat on the observation platform of the Dixie Flyer, Chicago-bound, and watched the panoramic fan spread out and out under the afternoon sunlight two glistening steel rails caught my eye—two rails that reached back toward Nashville via the shortest route—the straight line—and I said to myself, "At last I've found it." You may be wondering what vagaries of the imagination I am laboring under, but you shall know. For five days I had ridden continuously through the Kentucky bluegrass and then into Tennessee as a member of the Jackson highway inspection party and

in all that time we never looked down a stretch of road that seemed to be in a hurry to get anywhere.

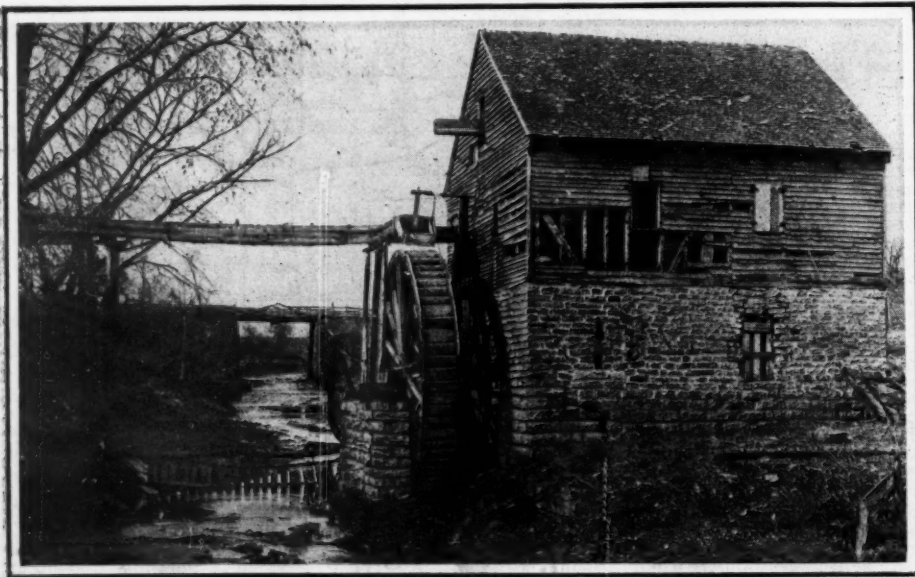
Just as I had congratulated myself that at least one avenue of travel in Tennessee and Kentucky was straight I nearly lost my balance as the famous train to and from Dixie lurched around a curve and bolted into a tunnel that I'll never be able to tell you whether it is straight through the mountain or whether it wanders about in its search for the other side. I don't know that you gather just what I am talking about, but it is this: Roads in Kentucky and Tennessee are not like roads in Indiana and Illinois, or a great many other states in their course. These states have no townships and no section lines,



*Right to left—J. G. Creveling, Nashville, Tenn., vice president; Eugene Stuart, secretary, Louisville Automobile Club; Emory G. Dent, Bowling Green, Ky.; J. T. Durham, Gallatin, Tenn., and the author*

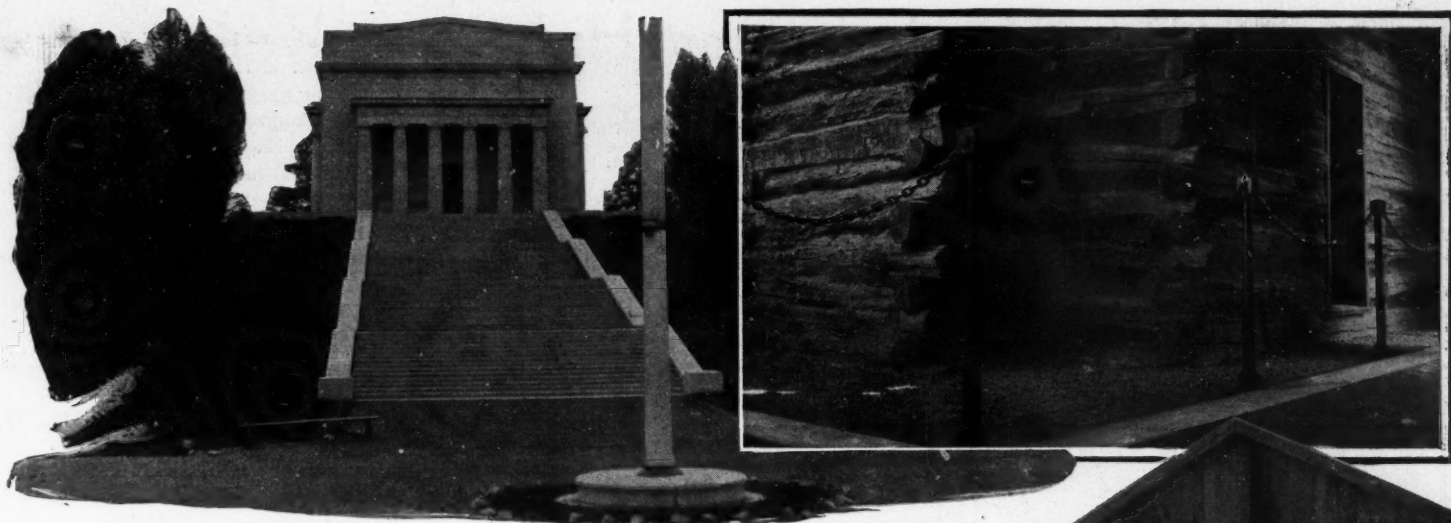
therefore no straight roads; the highway goes where it gets the easiest grade.

The foregoing is nothing against the roads of these two states; in fact, the winding process adds to their picturesqueness. Tourists driving the Jackson need never fear grades, for there are none of any consequence. The Jackson highway through Kentucky and in Tennessee as far as it has been definitely located follows the old pike laid in the early part of the nineteenth century—a pike that served the South and furnished a line of communication between the South and the North and East long before there were any railroads in those sections to meet that need. Further, this pike was laid out by engineers who came to this country from France—men who knew road building as few others did or do at this time. The government stipulated that this road was not to have more than a 4 per cent grade at any point and that accounts for the ease with which one can drive it today. Besides, the old Telford foundation is as solid today as it was laid nearly 100 years ago. A little top dressing and a roller and grader makes



*The old grist mill at Bardstown, Ky., once active, now still*





Stone vault which houses the old Lincoln cabin and protects it from the elements



Above, part of Lincoln cabin, and below building, the logs of which came from old Lincoln schoolhouse



Solid line represents located part of Jackson Highway; dotted line, proposed

of this old pike the best road that can be constructed.

We left Louisville on Friday morning and wound down through the Bluegrass region, stopping for a few minutes at Shelbyville and reached Frankfort, the state capital, about noon. We had a rather rigorous schedule all during the trip from Chicago south and we kept very close to it. We had no punctures or difficulties of any kind while on the trip and now that it is all over I won't have to knock wood as I am so often told to do when I begin bragging. The Kentuckians in the inspection party are proud of their Bluegrass section and well they may be. The restful rolling slopes and smooth white ribbons of roads are a revelation to anyone who has tried Illinois roads, even some places on Chicago's north shore.

#### Old Markers Still in Evidence

This old highway is marked all along with the old iron markers that label it as the historic stage route between Zanesville, O., Maysville, Ky., Lexington, Nashville, Tenn., and Florence, Ala. These old markers have seen service back in the early part of the 1800s and they cannot be improved upon so far as foundation and location are concerned.

Governor Stanley gave us a reception in the new state house at Frankfort and later a meeting was held in the old Capitol hotel, where I was introduced to my first mint julep—also my second. This old hotel is a landmark in Frankfort and has housed many a prominent man of this country and the South.

At Frankfort one finds an old but attractive town nestling between the steep and rugged banks of the Kentucky river. You probably will recall the killing of William Goebel in front of the old state capitol, the bullet coming from the office of the secretary of

state. Several men have served time and one is less than a half mile away serving a life sentence for the killing of Goebel. Two monuments to Goebel, one in front of the old capitol, where he fell, and another marking his grave have been erected.

Frankfort also is the last resting place of Daniel Boone, his grave and monument being situated on a cliff overlooking the river, the new capitol and the greater part of the city. Many illustrious men in the history of Kentucky are companions in death a few feet from the Boone grave.

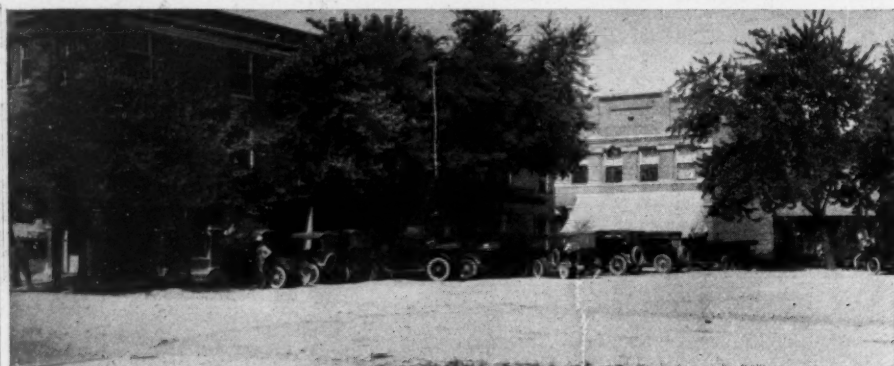
Just out of Frankfort is the Taylor distillery, where I saw 50,000 barrels of Old Taylor whiskey growing old in two large warehouses. The grounds of this place, which, to make it seem more like story-book tales, is hid down in a valley off the main road—are a veritable paradise. No expense has been spared to make a park of the grounds, and all the water used in distilling the whiskey comes from a spring in the middle of the grounds, protected by a peristyle.

A little farther on comes the McKee Bros. prize hog farms, where hogs that weigh 1,000 pounds and are worth \$10,000 are no novelty. Less than a mile from there is Col. Taylor's prize Hereford stock farm, where one may see bulls that cannot be bought for thousands of dollars. Woodford is valued at \$12,500 and Weston Prince and Renown are equally valuable.

Next comes Lexington, which



Marker of old stage route through south



At the top is a view of the crowd at Salem, Ind., listening to Dr. Ben L. Bruner, Louisville, Ky., tell what the Jackson highway means. Next is the hotel at Hogenville, Ky., a modern structure built for motor tourist accommodation. Next, to the left, is the Bardstown, Ky., Catholic church, in which are some famous paintings, and at the right the old courthouse where Harriet Beecher Stowe saw Uncle Tom sold. At the bottom is shown Emory G. Dent addressing crowd at Vallonia, Ind.

is rich in historical associations, since it was the birthplace and is the resting place of Henry Clay, who at one time introduced a bond issue in Congress for the improvement of this very pike that now makes up a part of the Jackson highway, and the man for whom the highway is now named—Andrew Jackson, then president and bitter political enemy of Clay—vetoed the measure.

A little beyond Lexington is the Elmen-dorf farm, owned by the Haggin estate. This is the finest dairy farm in Kentucky and among other things to be seen here are green houses in which grow nectarines, peaches, melons, grapes, figs, and other fruits, which go to eastern markets when the weather is such that this kind of fresh fruit is a novelty.

Paris, Ky., is the county seat of Bourbon county, not named for whiskey, but for the Bourbon family of France, which did so much for American colonists. Over past Carlisle, which by the way, is well worth a visit, is Washington, a quaint little town where Harriet Beecher Stowe got the theme for Uncle Tom's Cabin. She also wrote it in this village, which was the birthplace of Alfred Sidney Johnson, a historic figure in the Confederacy.

#### A Long Town

Maysville is a long town. It is stretched out along 4 miles of the Ohio river and in the widest place the town is not more than one-half mile in breadth. It is a quaint town, its ferry and the high bluffs above the city giving it a setting that few cities in this country enjoy.

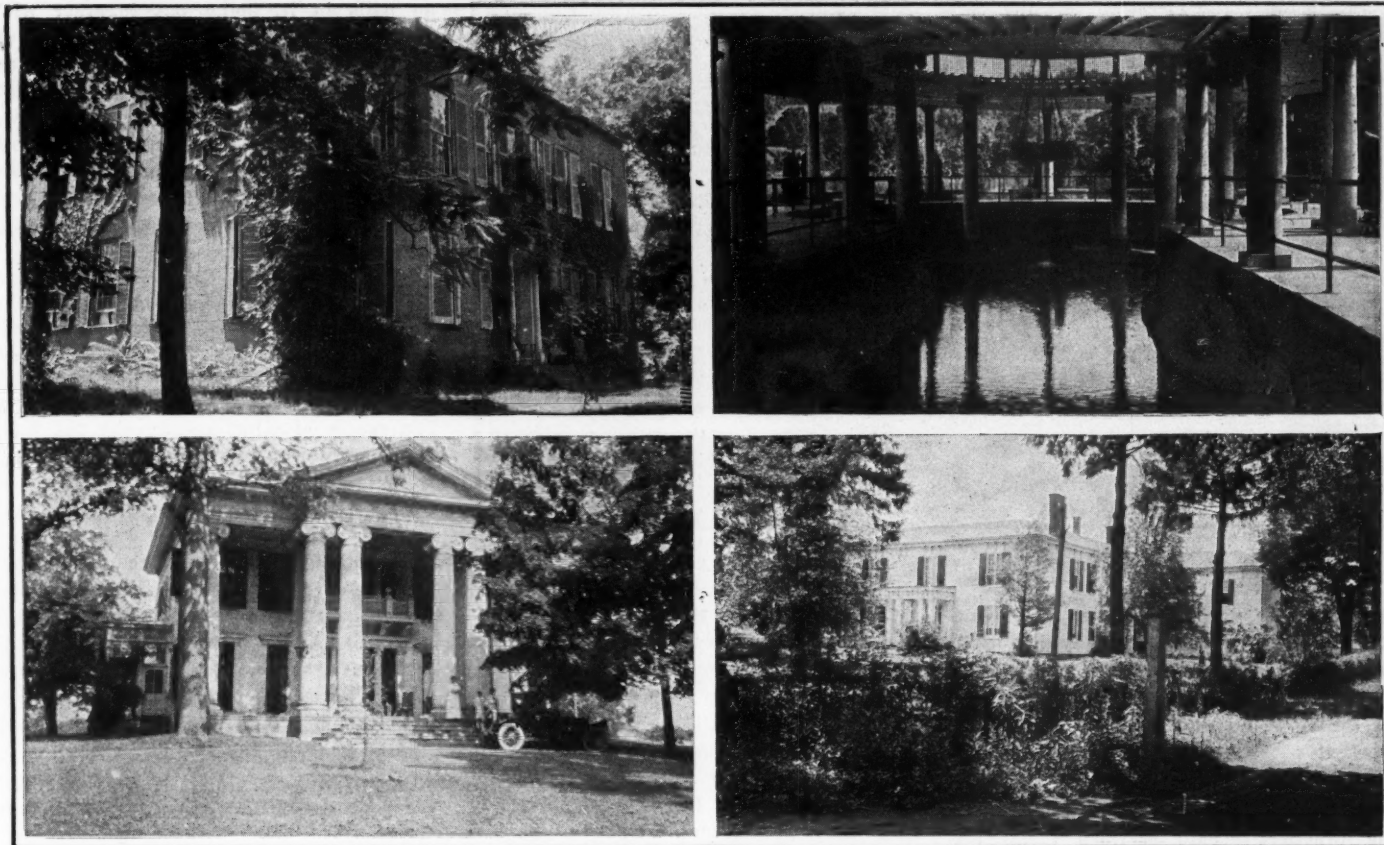
After spending the night in Maysville, a city which handles more tobacco every year than any other in the producing territory, the trip back to Louisville was made by train, as this trip, as I said before, was a relay tour. We found the 68 miles between Louisville and the Lincoln farm a nice forenoon drive, leading through Bardstown, Athertonville and Hogenville. Bardstown is a place where the tourist will want to stop for a few hours, at least, for here one finds much of historic interest. A trip to Federal Hill, just outside of the town, should be made to visit the birthplace of "My Old Kentucky Home." Here stands the old home about which and in which this old familiar song was written. A little pickinny showed me in and, with the sun shining down through the trees that shelter this old structure, the real atmosphere of the old place that must have been felt by the author of the song when he penned:

"The sun shines bright in the old  
Kentucky home,  
'Tis summer, the darkies are  
gay—"

came over me and I would advise that you time your visit to this old home so that you get there on a bright day about noon. You will see it at its best then.

When Louis Phillipe fled from France during the revolution in the late part of





Above—House in which "My Old Kentucky Home" was written. Below—J. G. Creveling's home, typical of Nashville's country residences

Above—Spring and peristyle covering it at the Taylor distillery. Below—The old Atherton homestead at Athertonville, Ky.

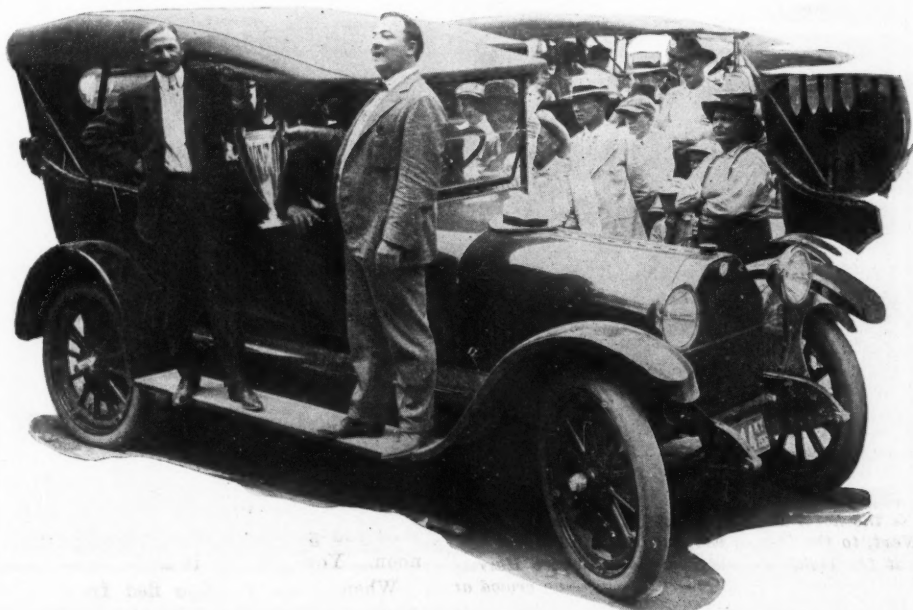
the eighteenth century he came to this country and brought with him several Vandykes and Rembrandts for safe keeping. He made Bardstown his home for a time prior to going back to become the king of France, and left there these paintings which now hang in the little Catholic church just to the south of Bardstown. I have seen many churches, but the interior of this place of worship is easily the most beautiful of any it has been my pleasure to see. Anyone passing through this old

town should be sure to visit this church, for the paintings therein, especially that of the crucifixion that embellishes the altar, is said to be one of the most valuable in America, if not in the whole world. This is all the more surprising when it is understood that Bardstown is only a small town. This is quite a Catholic center. There are schools, and a monastery, the oldest in America, and known as Gethsemane. This home for Franciscan monks was established in the early 30s and has

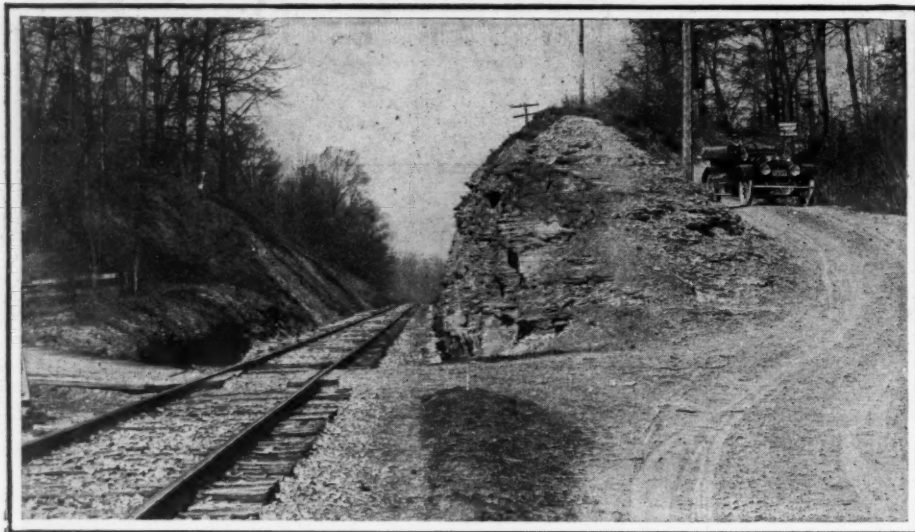
been told of in James Lane Allen's "White Cowl."

Not far south of New Haven, which is just a little way from Bardstown, I discovered that women may be partners with man in more ways than one. Over the door of a little roadside store I read a sign announcing that the firm name is "P. H. Woods & Wife." Surely women are shown deference to a marked degree by the southern gentlemen.

We crossed Rolling Fork river, which separates Nelson from Larue county, and on the waters of which Abraham Lincoln's father began his journey to Indiana via water. He floated what worldly goods he had down this river on an improvised raft. His worldly goods did not consist of any great volume, since a part of them had been traded for three barrels of whiskey according to residents of that locality, whiskey being almost legal tender in those days. After crossing Rolling Fork river you come into the little town of Athertonville, birthplace of Peter Lee Atherton, father of the Jackson highway and its president, home of the Atherton distilleries, at one time owned by Peter Lee and his father. Knob creek winds its way down through the country just south of Athertonville and natives of this section can point out for you where Abe Lincoln once nearly lost his life in this creek. In the edge of Athertonville is an old building made from the logs of the schoolhouse where Lincoln went to school. None would ever suspect that the little log building



Presenting Emory G. Dent with a silver cup in appreciation of road work done in Allen county



*Road through the Millport Knobs in southern Indiana near New Albany*

that sets in a yard that serves as a corral for pigs and chickens has any historical associations, but it has and officials of the Jackson highway promise to move it out on the road, build a fence around it and mark it with a tablet.

A few miles to the south of Athertonville you come to Muldraugh's hill, one of the prettiest scenic sections along the Jackson highway in Kentucky. The characteristic 4 per cent grade makes many turns necessary before you reach the top, and besides this very hill used to be a rendezvous for the James boys when they were not busy in Missouri or the West. Dropping down off this hill, it is only a short run to Hogenville, the county seat of Larue county, and 2 miles from there to the old Lincoln farm.

#### **Lincoln Farm a National Park**

The Lincoln farm will be dedicated as a national park September 4. President Wilson will go there for the ceremony and it is expected that thousands of patriotic Americans will be present. That the roads leading through Athertonville, Muldraugh's hill and Hogenville may be of the best at that time, President Atherton told Hogenville people that he would rebuild the 7 miles from Muldraugh's hill to Athertonville if they would see to it that the hill was put in the best of condition. Further he volunteered to keep this 7-mile section in repair for 3 years if the Hogenville people will Muldraugh's hill. President Atherton said he was interested in his own county, and further, he wanted to know what real road maintenance costs.

We visited the Lincoln farm, just out of Hogenville—this town by the way has recently built a first-class brick hotel, one of the best seen along the road from Louisville to Nashville—and saw the old Lincoln cabin, now protected from the elements by a stone vault, and drank at the spring from which Honorable Abe used to carry water.

During the afternoon we drove to Glasgow and it was on the way from Buffalo

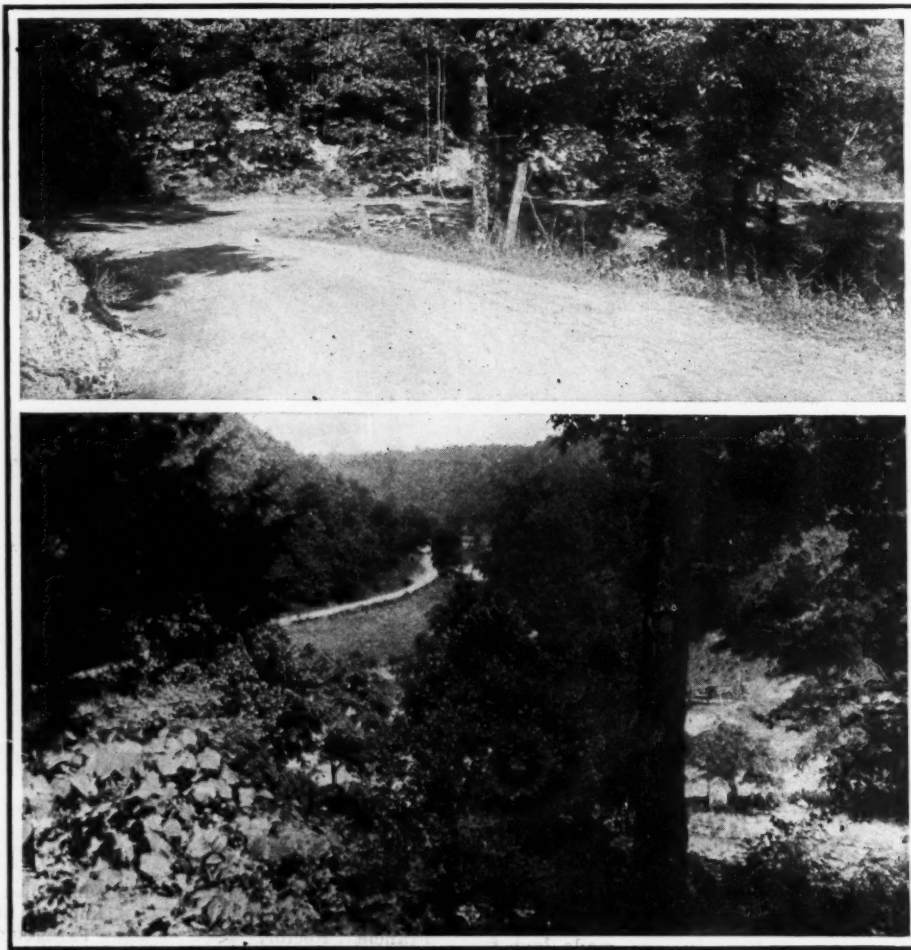
to the Green river, the line between Hart and Barren counties, that the roughest roads of the trip were encountered, especially Sand Hollow.

Glasgow, Ky., has three hotels, sufficient to take care of almost any kind of touring traffic that it may be called upon to handle. Just as we reached Glasgow we passed a house built by George Washington for his niece, who married General Spottiswood. The house, which was built in 1788, has

no nails in it, being put together with wooden pegs. There are three garages in Glasgow that would be a credit to any city. Although the city has a population of only 2,200, one dealer who handles two medium-priced cars in that locality told me he sold fifty cars in the last 2 months which shows that there must be fairly good roads or there would not be such a demand for cars there.

#### **Allen County Honors Dent**

The last leg of our run was from Glasgow to Nashville. Allen county, Ky., the last one on the Jackson highway before reaching Tennessee, has some fine roads. The people of Allen county—by the way, this county was the poorest in the state so far as taxable property was concerned until within the last 12 months, when oil was discovered in considerable quantity—are enthusiastic over good roads. Emory G. Dent, once a resident of Scottsville, the metropolis of Allen county, but now living in Bowling Green, which is in the adjoining county, has business interests in both cities. When he lived in Scottsville he was instrumental in the formation of the Central Lincoln Road from Nashville to Louisville, now a part of the Jackson highway. He moved away from Allen county, but he did not forget the Central Lincoln road and in consequence he has done more than any other man to make Allen county's



*Above is a road scene through the hills of southern Indiana, and below is a view on Muldraugh's Hill in central Kentucky, once a rendezvous of the James boys*



part of the present Jackson highway of the best. As evidence of how well he has succeeded in the hearts of the people of Allen county, it may be said that they met us at the county line with a brass band and fifty machines. When we got to Scottsville Dent was presented with a silver cup for his work in bringing Allen county's road up to par.

A Gallatin, Tenn., delegation escorted us out of Allen county and into Tennessee. I was shown a house, half of which is in Kentucky and half in Tennessee. The owner built it that way for a purpose—both Tennessee and Kentucky are dry at that spot, and—well—nuf sed.

A little farther on we came to a town now known as Turner Station, but once it had the euphonious name of ABC. 'Tis said that a man named H. Clay Cook used to live there and he got his mail addressed:

H C C

A B C

X I C

which translates into H. Clay Cook, ABC, Tenn.

Sumner county, of which Gallatin, Tenn., is the seat of government, and Allen county, just across the line in Kentucky, used to be the scene of some guerilla warfare back in the 60s.

We found Gallatin much interested in roads and the same is true of all of Sumner county. Some strenuous work will be done on the first mile of Jackson highway in Tennessee during the summer. This passes through an estate, the heirs of which have refused to give adequate right-of-way, but a new owner promises to be more generous.

E. G. Dent, Peter Lee Atherton and J. G. Creveling, vice-president of the highway, voluntarily offered a team and man to work on this stretch during the week of August 7, when work all along the route will be done.

#### Gallatin Locale of "Tennessee Judge"

Gallatin has a good hotel and the dining room is one that will prove of interest to the hungry and dusty tourist. The furnishings are such that one might think he was in a metropolitan hotel. The town of Gallatin is the scene of Opie Read's "Tennessee Judge." Some folks say that Opie is not very popular in Gallatin.

The last stretch of the Jackson highway from Gallatin to Nashville is under repair, but 20 to 25 miles per hour can be made easily. Getting into the county in which Nashville is situated, one finds hard pike all the way into the city. This city is as far as the Jackson highway is definitely decided upon. A pathfinding tour to New Orleans over the Mississippi route one way and the Alabama route the other will be taken in October and at that time the better of these two routes will be selected for the permanent part of the Jackson highway from Nashville to New Orleans. A similar trip was made last fall and these two states have been put on their mettle to see what they do by fall.

## Answers to Inquiries for Road Data

### Morrison, Ill.-Detroit, Mich.

MORRISON, ILL.—Editor Motor Age—Kindly advise the best route between Morrison, Ill., and Detroit, Mich.—Glen Smith.

On your trip to Detroit, Mich., you will find your best routing by going through Sterling, Dixon, Rochelle, De Kalb, Geneva, then you can go through Lombard into Chicago, then from Chicago go through South Chicago, Hammond, Dyer, to Valparaiso; or if you do not wish to go into Chicago, you can go from Geneva on through Aurora, Plainfield, Joliet, to Valparaiso, then you go through Laporte, The Bootjack, New Carlisle, South Bend, Mishawaka, Elkhart, Middlebury, Howe, Brighton, Kinderhook, Cold Water, Quincy, Jonesville, Somerset, Cambridge Corners, Clinton, Saline, Ypsilanti, and Wayne, into Detroit.

Volume 4 of the Automobile Blue Book will give you the complete routing for this trip.

### Memphis, Tenn.-Eudora, Ark.

Memphis, Tenn.—Editor Motor Age—Kindly give the best route between Memphis and Eudora, Ark., also the distance. I would also like a small map of the route—Harry Gold.

In going from Memphis, Tenn., to Eudora, Ark., I think you will find your best route by going south through Lake Cormorant, Robinsonville, Hollywood, Tunica, Clayton, Dundee, Lula, Coahoma, Cloverhill, Clarksdale, Claremont, Tutwiler, Sumner, Glendora, Money, Greenwood, then go west through Ittawana, Cude, Indianola, Hollyridge, Dunleith, Elizabeth, Greenville.

Here you take the ferry across the river and go over to Lake Village, from Lake Village you go straight south to Eudora.

### Acme, Tex.-Yellowstone Park

Acme, Tex.—Editor Motor Age—Kindly give the best route from Acme, Tex., through Yellowstone Park, Salt Lake City, and return with the probable distance.—J. B. Newby.

In going to Yellowstone Park and Salt Lake City on a round trip, I think you will find it best to go to Childress, Amarillo, Dalhart, Clayton, Raton, Trinidad, Walsenburg, Pueblo, Colorado Springs, Denver. This is a distance of about 675 miles.

From Denver go up through Cheyenne, Wheatland, Douglas, Casper, Lost Cabin, Thermopolis, Basin, Cody, and into the Park. This is about 650 miles.

You go through the Park on about a 150-mile trip and come out at Yellowstone, go down through Idaho Falls, Pocatello, Brigham, Ogden, Salt Lake City, Price, Grand Junction, Montrose, Gunnison, Saguache, Salida, Canon City, Pueblo, then retrace your route from Pueblo, through Walsenburg, Trinidad, Raton, Clayton, Dalhart, Amarillo, and Childress, to Acme.

Volume 5 of the Automobile Blue Book will give you complete directions for this route both to there and back via both routes.

### Plymouth, Ind.-Stuttgart, Ark.

Plymouth, Ind.—Editor Motor Age—Kindly give information regarding the best route from Plymouth, Ind., to Stuttgart, Ark.—C. W. Metsker.

In going to Stuttgart, Ark., your best routing is to follow the Lincoln Highway up through Valparaiso, Dyer and Joliet, then drive south through Morris, Dwight, Pontiac, Lexington, Bloomington, Lincoln, Springfield, Litchfield, Staunton, Edwardsville, St. Louis, De Soto, St. Genevieve, Cape Girardeau, Allenville, Dexter, Campbell, St. Francis, Rector, Marmaduke, Paragould, Brookland, Jonesboro, Greenfield, Harrisburg, Forrest City, Brinkley, Clarendon, Devall Bluff, then to Stuttgart.

Volume 5 of the Automobile Blue Book will give you a routing for your trip from Chicago and Joliet to Devall Bluff.

### South Bend, Ind.-Elwood City, Pa.

South Bend, Ind.—Editor Motor Age—I wish to motor from South Bend, Ind., to Ellwood City, Pa., via Youngstown, O. Shall I travel over the Lincoln Highway, considering its present unfinished condition, or can Motor Age suggest a better route.—R. A. Coney.

In going to Youngstown, O., I think you will find better road conditions by going through Toledo and Cleveland, then down to Youngstown, rather than by following the Lincoln Highway. You will find a detour between Goshen and Ligonier on the Lincoln Highway, which is also the road to Toledo, but from Ligonier through Kendallville, Bryan, Wauseon into Toledo the road is in pretty good shape.

From Toledo go through Woodville, Fremont, Clyde, Bellevue, Norwalk to Wake-man, here you have a small detour that is not very good in wet weather. Then drive through Oberlin, and between Oberlin and Elyria the detour is very bad in wet weather, but if you take the longer routing by going from Oberlin down to Wellington, then over to Grange and up to Elyria you can get a macadam detour all the way. Then go from Elyria to Cleveland, and from Cleveland to Bedford, then through Twinsburg into Hudson over to Kent, Ravenna, Warren down to Youngstown. Then from Youngstown you go through Hubbard, New Bedford, New-castle, Mahoningtown, Newport, Wampum, then to Elwood City.

Volume 4 of the Automobile Blue Book will give you the complete routing for this trip.

### Neillsville, Wis.-Hampton, Ia.

Neillsville, Wis.—Editor Motor Age—Kindly give the best route between Neillsville, Wis., and Hampton, Ia.

What volume of the Automobile Blue Book covers this route, and what is the price of same?—L. Watters.

In going to Hampton, Ia., your best road is to go through Merrilan, Alma Center, Hixton, Blair, Ettrick, Galesville, Holmen, Midway, West Salem, La Crosse, Ridgeway, Witoka, Enterprise, Saratoga, Chatfield, Racine, Grand Meadow, Austin, Albert Lea, then south through Northwood, Manly, Mason City and Rockwell, into Hampton.

### Olustee, Okla.-Bristol, Tenn.

Olustee, Okla.—Editor Motor Age—Kindly give the best route between Olustee and Bristol, Tenn.—W. R. Kent.

On your trip to Bristol, Tenn., I think you will find your best routing by going south through Chillicothe, Vernon, Electra, to Wichita Falls, then through Bowie, Decatur, Ft. Worth, then go east through Dallas, McKinney, Anna, Vandalia, Honeygrove, Paris, Clarksville, Avery, Dekalb, New Boston, Texarkana, Fulton, Artesia, Prescott, Arkadelphia, Bismark, Hot Springs, Little Rock, Lonoke, Prairie Center, Clarendon, Forrest City, Memphis, Brownsville, Jackson, Huntingdon, Waverly, Dickson, Ashland, Nashville. From here you might get across to Knoxville if you have very good weather, but the roads are under construction and we do not advise it unless the weather is extremely good. If it has been raining you will find it best to go down to Huntsville, then over to Chattanooga and through Lenoir City into Knoxville, then from Knoxville you go through Jefferson City to Bristol.

Volumes 5 and 6 of the Automobile Blue Book will give you complete routing for your trip.



# The Readers' Clearing House



## HIS VALVE SPRINGS TROUBLESOME Use of Heavier Wire Would Impose Strain on Cam System

FRIARS POINT, Miss.—Editor Motor Age—I have been having trouble with the valve-springs breaking on my Saxon six. I have on hand some very good springs, but the coil is a little larger and about  $\frac{1}{2}$  inch longer, so that when put in place the tension is slightly more. Will this harm the motor in any way? If so, how?

2—Also, does Motor Age think I would notice an improvement in the running of this motor if I injected steam in the manifold; in other words, advise whether or not the various outfits advertised for this purpose are what they claim to be?—C. H. Johnston.

1—The wire size and length of the valve-springs equipped by the factory have been accurately proportioned for this particular motor. Heavier springs will create more wear on the valve lifting parts. We would suggest you write to the factory regarding your valve breaking trouble.

2—The outfits now being marketed which inject water vapor in the manifold are proving very satisfactory. Such an appliance also has a tendency to minimize carbon deposit.

### Adjustment of Klaxon Horn

Carlyle, Ind.—Editor Motor Age—How is the tone of the Klaxon horn adjusted?—S. G. Crow.

5—First unscrew the two small case-holding screws in Fig. 1, and remove the back of the shell 3. The teeth of the motor wheel should but slightly touch the button on the diaphragm. To change the adjustment, loosen the hexagon nut and turn screw 2 slightly with a screw driver. First be sure the screws 4-4 are in tight. This is the only method of changing the tone, and will not give much variation.

### American Converted for Speed

Dallas, Texas.—Editor Motor Age—Give an illustration of an American underslung roadster converted into a racing car. I have in mind a 1913 model.—De Forest Widmeyer.

A suggestion for rebuilding an American underslung car into a speedster is shown in Fig. 2.

### Timing Cameron Valves

Munich, N. D.—Editor Motor Age—We have a 1913, six-cylinder model 11 Cameron. Kindly advise how to set the intake and exhaust valves.—Elenbaum Brothers.

If the intake valve of any one of the cylinders is properly set, preferably the

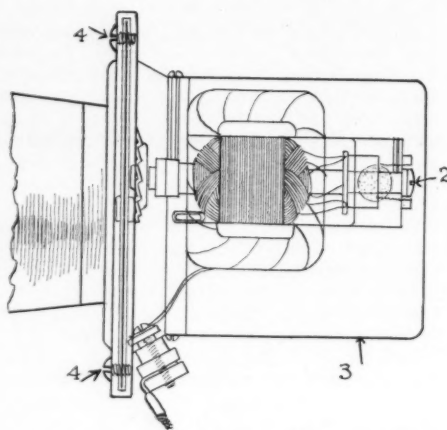


Fig. 1—Diagram to show method of adjusting the Klaxon horn

No. 1 cylinder for convenience, the rest of the valves will take care of themselves. It is only necessary to set the piston in No. 1 cylinder about  $\frac{1}{8}$  inch below top dead center and then mesh the timing gears so that the inlet valve will just start to open as the piston starts down on its stroke. The No. 1 cylinder is the one nearest the radiator.

## THE STEARNS AND WILLYS ENGINES Difference in Two Makes of Knight Motors Are Given

South Whitley, Ind.—Editor Motor Age—I understand there is some mechanical difference in the Stearns-Knight and Willys-Knight motors. If there is a difference, what is it?—J. Alba Glassley.

The valve actuating principles are the same. The differences lie in the motor suspension which is three-point in the Willys-Knight and four-point in the Stearns. The former has its exhaust manifold in a separate casting and the latter incorporated with the cylinder casting. Centrifugal cooling is used in the Stearns and thermo-syphen in the Willys. Willys ignition is by high-tension magneto and Stearns by distributor and storage battery. The cylinder dimensions are: Willys-Knight,  $4\frac{1}{4}$  by  $4\frac{1}{2}$ ; Stearns-Knight,  $3\frac{3}{4}$  by  $5\frac{1}{8}$ .

### Oil in Gasoline

Lawson, Sask.—Editor Motor Age—Is it good practice to put a lot of lubricating oil

into gasoline so as to oil above the pistons, etc., of a new car? I have had an argument on this, and I say "No." Am I right?—Malcolm N. Lenning.

On a new car in which the motor is particularly stiff, the addition of a small quantity of oil in the gasoline would probably prove beneficial to guard against seized bearings. A continuation of this practice, however, is liable to result in undue trouble with sooted spark plugs and excessive carbon deposits.

## A SIX AND EIGHT COMPARISON Reader Wants to Know Abilities of Hudson and Cadillac

Waxahachie, Tex.—Editor Motor Age—Which has the highest crankshaft speed, the Hudson Super-Six or the Cadillac Eight?

2—What is the gear ratio of each?  
3—What is the maximum speed of each with five passengers on good dirt roads?  
4—Which has the most power and is the better hill climber?—W. D. Anderson.

1—Both the Cadillac eight and the Hudson Super-Six engines can run at over 3,000 r.p.m., and as to maximum speed, there does not seem to be much difference. The peak of the Hudson power curve is at 2,400 r.p.m., at which speed the horsepower is about 77. The Cadillac model 53 engine develops about 77 horsepower at 2,600 r.p.m.

2—Unless otherwise specified, the Hudson is furnished with a 4.5-11 to 1 ratio, and the Cadillac with a  $4\frac{1}{2}$  to 1 ratio.

3—Both will do better than 60 miles per hour with these ratios.

4—You will have to judge that for yourself. We do not know.

### Ammeter Fails to Register

Raymond, Kan.—Editor Motor Age—In the case of an electrically equipped car in which the ammeter shows no charge or discharge and the lights will not burn nor the horn sound, but the starter works all right, will it do any harm if a wire is placed across the back of the ammeter from terminal to terminal?—Marion A. Demint.

Judging from your description of the trouble, it is caused by a loose connection in the ammeter, and to connect across the ammeter terminals, thus cutting it off, will not do any damage except that you are remedying the symptom rather than the possible cause of the trouble. It is suggested that when the opportunity offers you have the ammeter examined.

## ON TWO-CYCLE ENGINES FOR CARS Motor Boats Chief Users of That Type of Motor

Milwaukee, Wis.—Editor Motor Age—Is there a two-cycle engine being manufactured at the present time? If so, by whom?

2—What would be the revolutions per minute of such an engine?—C. H. Flebrantz.

1—To our knowledge there is no two-cycle motor being manufactured exclusively for motor car use. There are, however, a large number of marine motors of this type on the market.

2—Revolutions per minute in any motor depends entirely on the design of the

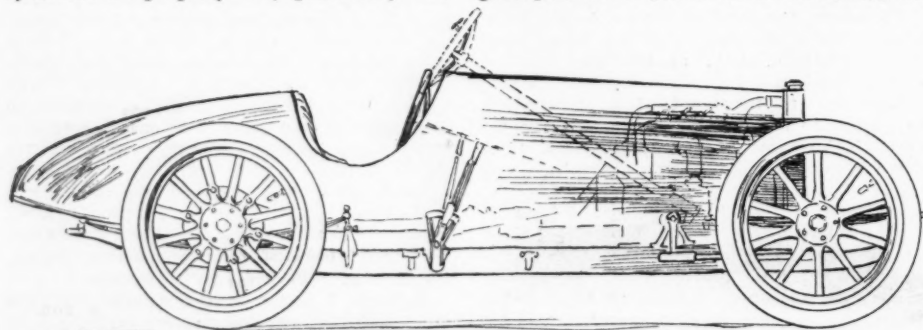


Fig. 2—American roadster converted to speed car



power plant itself. For marine use, two-cycle motors seldom turn over 1,000 revolutions per minute.

#### HOW TO SET THE TIMING GEARS Easy Method of Setting Spark to Fire Motor Properly

Linesville, Pa.—Editor Motor Age—I drive a Monroe roadster, using a Connecticut automatic ignition with Auto-Lite generator. The generator was sent to the factory to have the output raised. The generator gear was marked where it meshed with the timing gears. When received from the factory it had been overhauled, a new gear had been put on, also a spiral gearshaft which drives the timer. My marks are gone. Kindly advise how to time the spark.—Subscriber.

Retard the spark lever, set the piston of No. 1 cylinder about  $\frac{1}{8}$  inch below top dead center, mesh the gears so that the points in the timer for No. 1 cylinder will break at exactly this point. With this adjustment the motor should be timed properly. If it is not, the motor will knock with the spark fully advanced, showing that the timing is too early, or labor heavily with the spark retarded, showing that the timing is too late. The proper adjustment can then be obtained by altering the mesh of the gears one tooth at a time.

#### Reason for Plug Fouling

Moweaqua, Ill.—Editor Motor Age—I have a Ford car, the No. 1 plug of which fouls badly and the oil gets around the valve stem until it is full to where the plate is. Is this the piston ring on No. 1 cylinder leaking oil or is it coming up through the valve stem?—R. W. Stembaugh.

It is quite improbable that the oil is coming up around the valve stem itself. Either one or more of the piston rings are broken or worn out of shape, or the piston itself has worn out of round, permitting oil to pass the rings into the cylinder. It is suggested, as the only accurate way of determining the cause of the trouble, that you examine the piston and rings in No. 1 cylinder.

#### Wants a Noisy Car

Warren, O.—Editor Motor Age—I have an Overland 6-1915 model. What could be done to the muffler on this car to make the explosions loud; in other words, sound like a locomotive?—E. A. Osborne.

If you must drive a noisy car you can obtain this end by removing the baffle plates from the inside of the muffler. With the exhaust passing into the muffler

shell with the resistance removed, a deep-toned exhaust, plenty loud, would be the result. Why not fit a muffler cut-out to the exhaust pipe? Such a device can be obtained from any motor car supply house.

#### Chevrolets Since 1913

Bulwark, Alta.—Editor Motor Age—Is the Chevrolet 4-90 an assembled car?

2—How long has the Chevrolet been sold in the States?

3—Has the ignition and starting system given satisfaction?

4—Does the entire electric system depend upon the storage battery?

5—Would it be possible to run on dry cells if the battery failed?

6—What is the bore and stroke of the Chevrolet 4-90?

7—What is the A. L. A. M. rating of the model T Ford?—C. E. Hewitt.

1—Yes, to a great extent.

2—The first models appeared in 1913.

3—Yes, as far as we know.

4—Ignition is through a distributor depending on the storage battery.

5—It could probably be wired to fire the motor on dry cells, but such an alteration might be harmful to the generator.

6—The bore is  $3\frac{1}{8}$  and the stroke 4 inches.

7—The N. A. C. C., formerly A. L. A. M. rating, is 22.5.

#### Locomobile Wiring Diagram

Rochester, N. Y.—Editor Motor Age—Kindly give a diagram of the starting and lighting system on the 1913 and 1914 Locomobile model M.—Harry Hempel.

The diagram asked for is shown in Fig. 3.

#### PERSISTENT KNOCKS MYSTERIOUS Cause May Lie in a Number of Different Things

Keota, Ia.—Editor Motor Age—Persistent knocks are noticeable in my Ford when the engine is idle, also a little when the motor is pulling. They do not interfere with the power of the car but are very annoying. What causes these knocks and what is the remedy?

2—Who makes the Super-Six motor?—R. Merle Hamilton, Jr.

1—Your information is too meager to enable us to direct you to the cause of the motor knock. It may be a loose connecting rod bearing, main bearing, wrist pin bearing, a piston slap, a pre-ignition knock caused by carbon deposits in the cylinders, or the motor may be incorrectly timed. You must always locate the knock

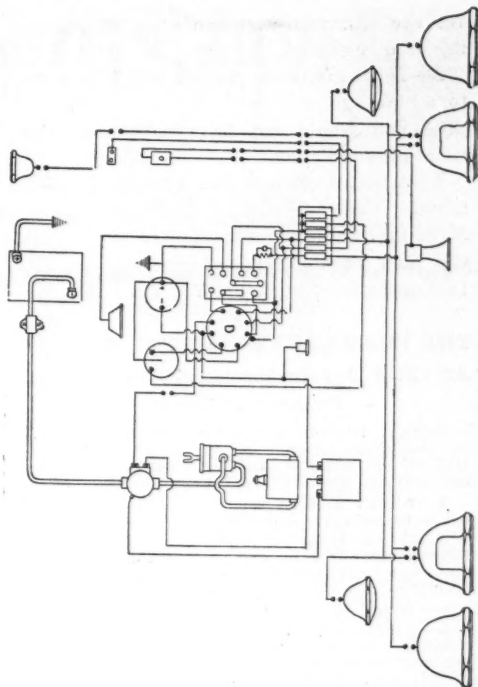


Fig. 3—Wiring diagram of 1914 Locomobile

first; then look for a remedy. Try shorting the spark plugs in each cylinder while the motor is running. If a cylinder which is shorted pounds severely, the connecting rod or wrist pin bearing is loose. If none of the cylinders knock any more than usual the trouble is probably carbon and it should be burned out or scraped out.

2—Hudson Motor Car Co., Detroit, Mich.

#### Reconstructed 1911 Cadillac

Princeton, Ind.—Editor Motor Age—We are forwarding to you photos of a reconstructed 1910 Cadillac. The radiator is the same as that used on the Paige, and the body and hood were built by us. Under the lid back of the front seat is another seat for one passenger and also providing plenty of room for tools, and a 15-gallon gasoline tank. The cost of the old car together with the labor and material for reconstructing it, was only \$800.—W. A. Mossman & Son.

A three-quarter front view of the reconstructed car is shown in Fig. 4.

#### KNOCK WITH SPARK RETARDED Undoubtedly Motor Is Full of Carbon— Try Overhauling

Austin, Tex.—Editor Motor Age—I have a 1914 model four-cylinder Cadillac with a two-speed rear axle. From 15 miles an hour and upward with the spark retarded, whether on the level or uphill, the car has a peculiar thump or knock. Mechanics are unable to determine whether the thump is in the motor itself or around the universal joint. All the motor bearings are tight, the crankshaft is true, the motor is tight in the frame, the flywheel is tight, the universal joint is not worn, but still the car has the peculiar thump. The knock is not as noticeable when running on advanced spark. The car has a great amount of vibration which other cars of this same model have not. Any suggestions in regard to the above will be appreciated.

2—I have also been considering the use of aluminum pistons as a remedy for some of the vibration. Would this be practical?

3—Would different connecting rods or wrist pins be needed, or could the old ones be used?

4—Give the names of some of the most reliable concerns making these pistons?—A Subscriber.

1—From what you say, this looks to be merely a spark knock, due to having the spark either too far advanced for heavy pulling or too far retarded in relation to the engine speed. Possibly there is considerable carbon in the engine, accounting

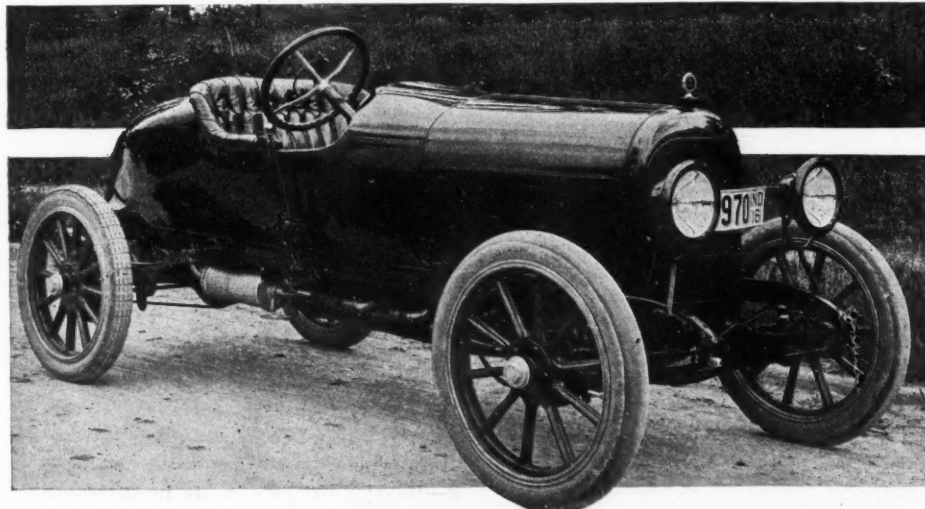


Fig. 4—1911 Cadillac reconstructed into speedster

for the vibration and knocking. Try having it overhauled.

2—Yes, aluminum pistons could be used to advantage.

3—You would not have to change the wrist-pins nor rods.

4—A.B.C. Castings Co., Cleveland; Aluminum Castings Co., Cleveland; Butler Mfg. Co., Indianapolis; Walter M. Levett Co., New York City; Pioneer Brass Works, Indianapolis; Stewart Mfg. Co., Chicago.

### THE ROAD CLEARANCE FOR SAFETY At Least 9½ Inches Should Be Allowed for Average Roads

Normal, Ill.—Editor Motor Age—What would be considered a safe road clearance of axles without cutting down on the speed of the car by using small wheels?

2—Kindly give an estimate of the weight of a car using a 110-horsepower motor?

3—Would 4,000 revolutions per minute for a four-cylinder 3½ by 6¼-inch motor be considered too high in speed to obtain good general results?

4—Would there be a great deal of vibration?

5—Kindly give the address of a jobber or manufacturer from whom I could obtain axles, transmissions, and clutch suitable for a motor of this size.—L. W. Paddock.

1—Not much under 9½ inches for average roads.

2—That is almost impossible, as much would depend upon the design of the engine and also the rest of the chassis. It probably would be in the neighborhood of 3,000 pounds, but that is only a guess.

3—Such speed is pretty high for average results, although it has been attained.

4—Very likely unless specially designed for such excessive speed.

5—Refer to the clearing house section in the advertising pages of Motor Age.

### INCREASING COMPRESSION IN SIX Attaching Metal Plates to Piston Heads Delicate Job

Lincolnton, N. C.—Editor Motor Age—I would like to increase the compression of my 1913 Chandler Six, Model 15. Can this be done by attaching metal plates to pressure surface of pistons? If so, what thickness should such plates show, and what would be the best method of attachment?

2—What carbureter gives the best service on this motor?

3—Are aluminum alloy pistons advisable for this motor?

4—Kindly give an opinion of the merits of steel-studded leather treads, such as are attached and worn over the tire, and held by the rim.—C. P. P.

1—Plates about ⅛-inch thick could be used, these being riveted in place. If they are used be sure to have them all of exactly the same weight, rivets included. However, this is only a makeshift, and might weaken the pistons. Another way would be to use new pistons that were ⅛-inch higher above the wrist-pin than the old ones, accomplishing the same result, or you could plane off the bottom of the cylinder block where it rests upon the crankcase.

2—Any standard make of carbureter ought to work satisfactorily.

3—Yes, aluminum pistons could be used to good advantage.

4—Such retreads have been very successful in saving tire wear and also in strengthening old and weak casings. They will slow up the car a little, due to clinging more to the road.

### Communications Received and Inquiries Answered

C. H. Johnston.....Friars Point, Miss.  
S. G. Crow.....Carlyle, Ind.  
Elenbaum Brothers.....Munich, N. D.  
J. Alba Glassley.....South Whitley, Ind.  
Malcolm N. Lenning.....Lawson, Sask., Can.  
W. D. Anderson.....Waxahatchie, Tex.  
Marion A. Demint.....Raymond, Kan.  
C. H. Flebrantz.....Milwaukee, Wis.  
Subscriber.....Linesville, Pa.  
Harry Hempel.....Rochester, N. Y.  
R. W. Stambaugh.....Moweaqua, Ill.  
E. A. Osborne.....Warren, Ohio  
C. E. Hewitt.....Bulwark, Alta., Can.  
R. Merle Hamilton, Jr.....Keota, Ia.  
W. A. Mossman & Son.....Princeton, Ind.  
Subscriber.....Austin, Tex.  
L. W. Paddock.....Normal, Ill.  
C. P. P.....Lincolnton, N. C.  
F. J. Allen.....North Yakima, Wash.  
Reader.....Pittsburgh, Pa.  
S. J. Evans.....Davenport, Ia.  
E. W. Jones.....Kansas City, Mo.  
No communication not signed with the inquirer's full name and address will be answered in this department.

### Wiring of 1911 Hudson

North Yakima, Wash.—Editor Motor Age—I have a Hudson 1911 model which I believe the mechanics did not wire correctly. Kindly give a diagram showing the proper method of wiring a 1911 Hudson.—F. J. Allen.

A wiring diagram is shown in Fig. 5.

### LESS POWER AFTER REGRINDING Compression May Have Been Reduced By Alteration

Pittsburgh, Pa.—Editor Motor Age—I have a 1914 Kirt. After running 5,000 miles in a year and a half, and showing lack of power, I had the cylinders reground and new and larger pistons put in, but this does not seem to improve the condition noticeably. Will power likely improve as the pistons get worn in, or should the engine show increased power at once?

2—If power is not improved in this way, what would Motor Age suggest?—Reader.

1—Probably you have lowered the compression by increasing the combustion space due to enlarging the cylinder diameter, without making any change in the valves to allow for the increased volume. This might reduce the power, but ordinarily that would be a small consideration. It might be that after the new pistons and rings have worked into the new cylinder walls properly the power will be increased.

2—You might plane off about ⅛ inch from the bottom of the cylinders where they rest on the crankcase, thus reducing the clearance volume above the pistons.

### LIGHT CAR WITHOUT A FRAME Cannot Give Weight of Proposed Car Without More Information

Davenport, Ia.—Editor Motor Age—How are the rear axle halves held in the axle casing of a semi-floating axle?

2—How large a rear axle shaft would be required for a car weighing from 600 to 700 pounds?

3—How large a driveshaft would be required for a car weighing from 600 to 700 pounds?

4—What thickness and of what material would be required for a frame and body combined as in the Cornelian for a monocoque? The frame having a maximum width of 22 inches, engine 18 horsepower, cantilever springs in rear and cross springs in front, side of frame to be 11 inches at greatest height?

5—What would be the approximate weight and would this construction be lighter than a and would this construction be lighter than a wooden frame with body built over?—S. J. Evans.

1—They are supported by one bearing adjoining the differential housing and another within the rear wheel hub, on each.

2—A ¾-inch shaft of alloy-steel stock should be heavy enough to carry the load you mention.

3—A 1-inch solid shaft or a hollow shaft of the same dimensions with tubing having ⅛-inch walls.

4—16-gauge stock was used in the body construction of the Cornelian. Possibly, in a car such as you describe a lighter material such as 18-gauge could be used.

5—This construction in a car of the dimensions you give, built without frame after the design of the Cornelian would weigh approximately 75 pounds less than a car built with the frame. We could not give the car weight accurately without knowing the motor weight. It would, however, very likely weigh less than 1,000 pounds.

### PURPOSE OF OFFSET CYLINDERS Comparison with Offset, Wrist Pins and Reason for Latter Design

Kansas City, Mo.—Editor Motor Age—How does the effect of offsetting the piston pin compare with offsetting cylinders?—E. W. Jones.

Piston pins are offset for the purpose of eliminating what is known as piston slap. In other words, when a piston pin is suspended in the center of the piston the piston weight is equally distributed on each side of the center line of the bearing. This balance allows the piston to vibrate, theoretically, resulting in wear on the cylinder walls. With an offset the weight is unequally distributed so that the piston cannot swing freely on its pin. Cylinder offsetting is for an entirely different purpose, it being designed to eliminate sparks knocked by the motor firing on dead center. When the center line of the bored hole of the cylinder is set ahead of the center line of the crankshaft, then when the motor fires it will operate against a slanting connecting rod.

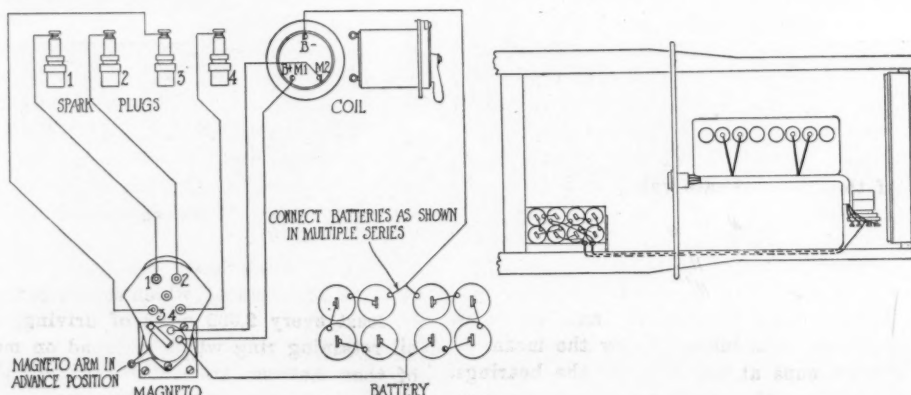


Fig. 5—Wiring diagram of Hudson 1911 model



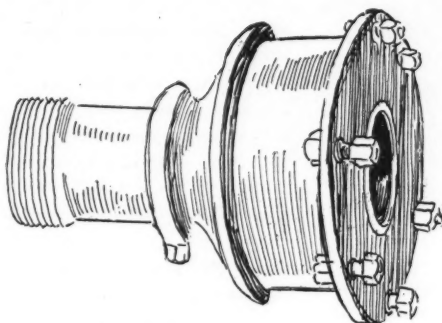


# The Motor Car Repair Shop

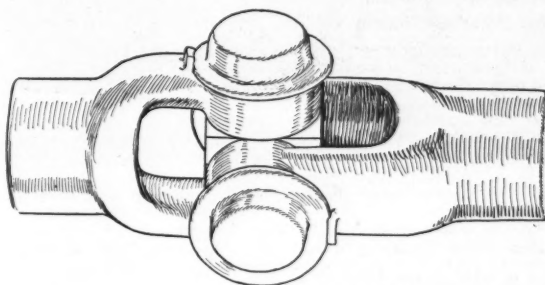


## Universals Suffer from Lack of Lubrication

Loss In Efficiency of Car Caused by Neglect of This Part



Typical enclosed type universal



Open universal of center-block type

THE writer visited a garage some little time ago and in the course of an afternoon watched a gang of men overhaul a large car. The purpose of the visit was to view with what speed this particular gang of men was able to tear a car down completely, clean it, adjust it and put it back together again. Be it said for the mechanics that their job was a marvel of speed, but after the car was completely assembled once more I could no longer contain myself on a certain subject that had troubled me during the overhauling and I asked:

"But how about the universal, aren't you going to clean or oil that?"

"We don't bother with the universals," was the reply. "When they do go wrong there is nothing left but to buy a new one."

### Universals Need Attention

This is an attitude which is only too common in repair shops, and there is nothing further from the truth than the supposition that a universal does not need attention. In reality it is one of the most vital parts of a car and upon its proper lubrication depends a great deal the amount of power that is delivered from the motor to the rear wheels.

Proper care of the universal, which is really an easy matter, will help to maintain the power of the car, insure against a noisy drive due to loose universal bearings and save much money in installing new ones. It is as vital a matter as the proper lubrication of the gearset itself, if the proportionate values of the two are considered.

Universal joints now most commonly used are of two types, the enclosed type, with a steel shell or a pair of shells one working against another, and the open type which is lubricated by the means of grease cups at the ends of the bearings. Both have their advantages and are pos-

sibly superior to leather joints, steel spring joints and other seldom-used types in their present stages of development. The fact that there are but two types in general use makes the care of them a very simple matter for the garage man, in fact makes it a profitable investment for him to keep repair parts in his stock.

Fortunately there is nothing of complexity in a universal, nothing to get out of order as a general thing, and the only thing necessary for their care is to keep them properly lubricated and free from road dust in the bearings.

In both types of joints the bearing surfaces are usually radial, although there are some universals on the market with sliding bearing surfaces. These radial bearings are either made up of center pins, one passing through the other to form a cross, or a spider with four bearing pins as a part of it, which work within case-hardened steel bushings. Case-hardening seldom is deeper than  $\frac{1}{2}$ -inch, and once this surface is worn through the softer stock wears rapidly and the universal or its center parts need replacing.

The cure is to keep a film of clean oil constantly covering these bearing surfaces. In the enclosed type of universal in which hard grease is retained in a steel shell it must be remembered that centrifugal force throws the grease to the outside edge of the shell, and for this reason a careless job of oiling in which the case is not completely filled with hard grease is practically useless, as the lubricant will be thrown to the outer surface of the shell and the bearings will run dry.

When the enclosed universal is disassembled for cleaning, which should be done at least every 2,500 miles of driving, the oil retaining ring which is found on most of them between the stationary shell and the shell which works with the drive shaft

should be renewed. As soon as this felt ring becomes sufficiently worn or broken, the oil oozes through it so rapidly that it is quite impossible to keep the shell filled.

In the open type, lubricant is forced directly to the bearings from four grease cups and as long as these grease cups contain oil there is little danger of the bearings running dry. In the most common type of open universal there is a square center block between two forks and the bearing pins pass one through the other and through this block.

### Provisions Against Dirt

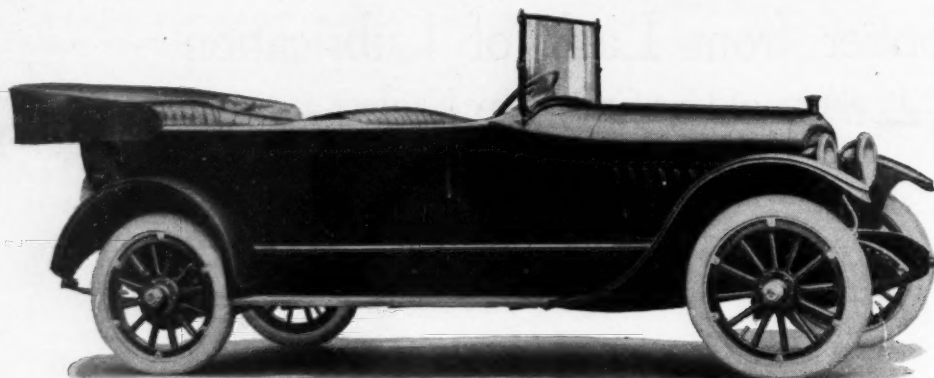
As it is possible for grit and dirt to work between the block and fork and up into the bearings if no provision is made to prevent it, there is inserted a felt washer within a groove on the surface of the fork which works against the center block and directly under the bushing. This washer acts, both as a prevention against the entry of dirt into the bearings and as an oil retainer to keep the lubricant from losing out between the work and center block. It is always advisable when overhauling such a universal to put in fresh felt washers of the exact size, preferably the ones furnished by the factory.

Many a garageman has completely ruined a universal joint by endeavoring to drive out a worn bushing from the fork in which it is set. It is a futile task to try to drive out these bushings with a hammer, as they are pressed into the forks at the factory with between five and ten tons' pressure. If a hand press is not available in the garage, send the fork back to the factory for a new bushing.

Universals should be oiled at least once a month. If this care is taken conscientiously the assembly should last as long as the car, and in the present day of neglected universals this is seldom the case.

# New Lines Found in Ross Eight for 1917

Mechanical Changes Are Few — Price  
Unchanged at \$1350



*Side view of the Ross eight, showing new body lines*

FOR 1917, the Ross eight-cylinder car appears in a new dress that is in accord with latest body fashions in every particular. The vehicle is practically the same mechanically as it was when this model was first brought out by the Ross Automobile Co. over a year ago, but there have been some important revisions of its lines that make it a very attractive car. However, the price remains unchanged at \$1,350.

Equipped with a standard eight-cylinder Herschell-Spillman engine with dimensions of  $3\frac{1}{4}$  by 5 inches, it has ample power under all conditions, and although it is a big car with a wheelbase of 130 inches, it is lively and responds readily to the throttle. Ross has taken care of the suspension so that riding is in comfort whether the full quota of seven passengers is being carried or only one or two.

The modern double-cowl effect has been worked out at the back of the front seat, and the hood slopes into the cowl without a break, the radiator shell also sloping to the hood in very pleasing manner. Doors are wide and fit snugly, and there is enough rake to the steering column to assist in giving a racy appearance so often sought by designers, but sometimes not attained.

## Chassis Is Substantial

Stripped of its new body, the chassis presents a most substantial look, with a tapered frame of deep section, sturdy drive members and long and wide springs. In unit with the motor are the clutch and gearset, and the drive shaft is inclosed within an efficient torsion tube. The specifications include a multiple-disk clutch, floating rear axle, semi-elliptic springs all around, rear gasoline tank with Stewart vacuum feed, Zenith carbureter, Ward-Leonard two-unit starting and lighting system and 34 by 4 tires.

Turning to the most important unit, the motor, it is at once noted that no alteration has been made in the Standard Herschell-Spillman design. The cylinder dimensions give a rated power of 33.84 horse-

power, with a displacement of 331.8 cubic inches, but the motor is capable of delivering upwards of 75 horsepower on the block, an evidence of the fact that there is plenty of power under the Ross hood to take care of the car under all conditions.

Inasmuch as this engine has been described on several occasions, it is not necessary to go into very great detail. The photographs indicate the general arrangement, with the two blocks of cylinders at 90 degrees, and staggered to allow the two opposite connecting-rods to be mounted side-by-side on the common crank bearing. The valves are made reasonably accessible by the disposition of the parts that of necessity have to be in the V between the cylinder blocks, the carbureter being so mounted that it is little in the way, and the exhaust manifolds being well above the valve compartments. Although the ignition distributor is mounted vertically at

the extreme rear of the cylinders, it is really not in the V, and so the carbureter is practically the only obstruction.

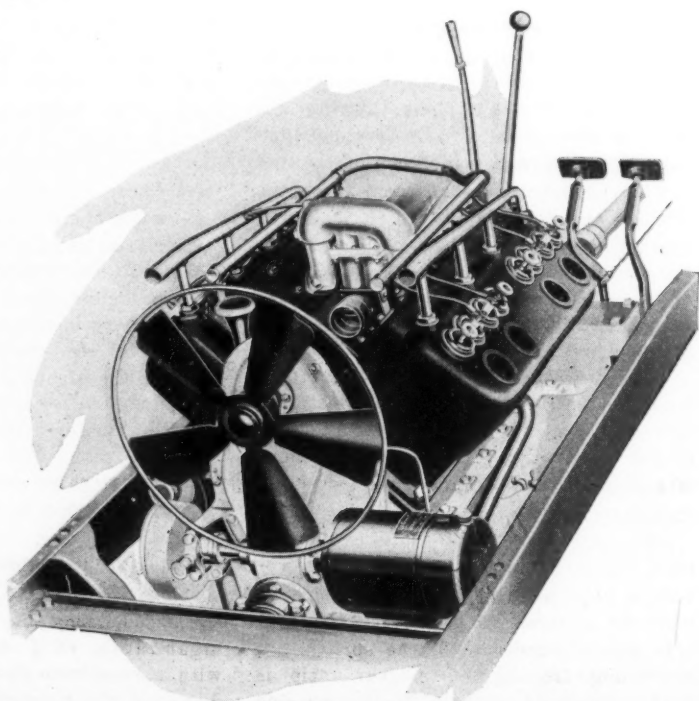
Conventional practice holds throughout the internal construction of the motor, there being a sturdy crankshaft, directly above which is mounted the single camshaft that actuates both sets of valves through rockers, that are hinged to the top of the crankcase. At the front there is a cross shaft that is connected to the crankshaft by a worm gear and on its right end this shaft drives the double water pump, while the left end connects to the generator armature. This cross-shaft drive is inclosed by the same plate that houses the spiral gears driving the camshaft and the fan shaft above this latter. Thus a very compact front end is obtained with not even an exposed fan drive. The drive of the vertical ignition distributor is through bevel connection with the camshaft at its rear end.

## Starting Motor Mounting

On the right rear side of the engine is carried the starting motor, this connecting automatically with the flywheel teeth by means of the Bendix drive unit, whereby, when the current is switched to the starting motor through the starter pedal, the rotating of the armature shaft automatically throws the pinion gear into mesh with the flywheel. After the engine picks up and rotates faster than the armature shaft, the pinion is again automatically thrown out of mesh.

As the flywheel is inclosed, there is practically no exposed operating mechanism.

*Front view of the  
Ross light motor,  
showing generator  
drive and mounting*





ism in this powerplant, a feature that is commendable from a mechanical and maintenance standpoint, although it adds slightly to the weight.

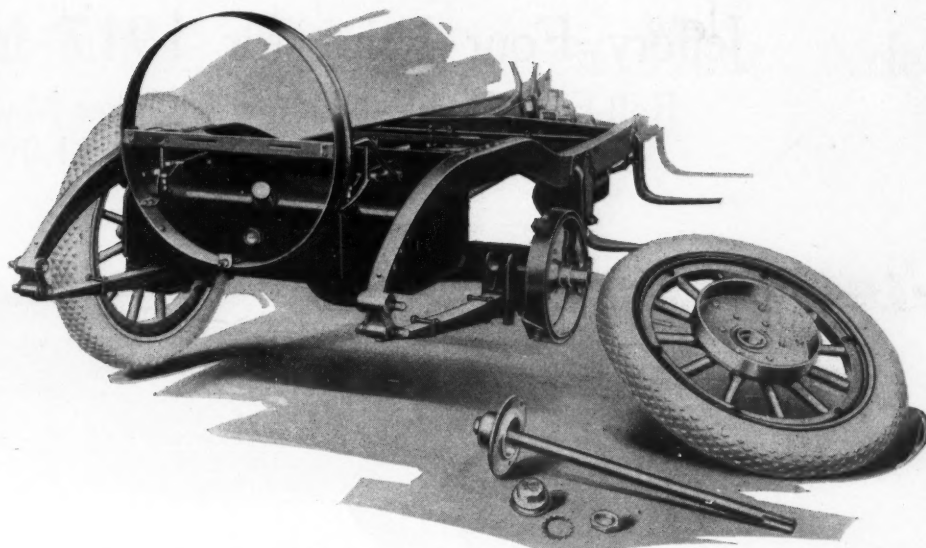
Lubrication is given special attention, as it is an important part of the proper operation of an eight. There is no splash to it; distribution to the various bearing surfaces is entirely by pressure maintained by a regulating valve between a minimum of 10 pounds per square inch and a maximum of 40 pounds per square inch. The gear pump is located in the crankcase well on the bottom of a vertical shaft which takes its drive through spiral-gear connection with the camshaft. Oil is delivered through a longitudinal tunnel running the length of the crankcase, and from this by individual branches to the three main bearings of the crankshaft and the three camshaft bearings. The crank webs are drilled, and the oil is thus led by centrifugal force to the lower rod bearings, from which it is piped through steel tubes to the wrist-pin bearings these tubes attached to the rods. An overflow valve allows the excess over the requirements of these bearing surfaces to be delivered to the front gears, keeping the gear assembly submerged well above the cross shaft.

#### One Plate in Clutch

Ross is using the Borg & Beck clutch, which is the type in which there is only one plate, this running dry between two wire-woven asbestos plates, and by a series of levers the force holding the plate in engagement is stepped up to a very large amount without the use of an extraordinarily heavy spring. A 200-pound spring is sufficient to produce a pressure of 2,500 pounds at the point of plate engagement, due to the construction. This, therefore, prevents any clutch slippage, and at the same time the unit is easy to operate, requiring only a light pressure on the clutch pedal to disengage it. In connection with the clutch mechanism, the pedal is adjustable for position, due to the use of a flange drilled with several holes and attaching to a flange on the pedal in a number of different positions wherever any set of holes in the two flanges will register.

A Grant-Lees gearset also is incorporated with the engine, this being a very compact unit affording the usual three speeds. The gears and shafts in this unit are constructed of chrome-nickel steel, and the gears have wide faces with stubby teeth for strength. Just back of the gearcase is the speedometer drive gearing, and then a universal joint, after which the propeller shaft enters a torsion tube that is in unit with the rear axle. The front end of the tube is supported in and slides in an arm that hinges to the bottom of the gearbox.

Both axles are made by the American Gear Co. and follow standard lines. The rear unit has a pressed-steel housing that is webbed outside at top and bottom as a strengthening factor, and the springs are underslung from it. The gear ratio is slightly lower than 4 to 1 in order to give



*View of the rear spring suspension and tank mounting of the Ross eight*

the motor plenty of consideration. This ratio is such that the car is afforded excellent accelerative possibilities.

Not quite familiar is the semi-elliptic form of spring suspension at the rear. In the Ross adaptation, the springs have a length of 57 inches and due to the generous bend down of the rear of the frame, they are normally nearly flat, even though they do pass below the axle. This allows them to work efficiently to dampen road shocks and to promote easy riding as well as being better for the springs themselves.

Hung from the rear cross member of the frame is a large gasoline tank, so positioned that it is practically balanced on

its mounting, preventing any bending strains being set up. A large-size vacuum feed tank is mounted on the front of the dash, to bring the fuel forward from the reservoir. On the right side of the frame and just to the rear of the motor the U. S. L. storage battery is carried. This is concealed by the running board apron, and is conveniently reached through a door in the latter.

Nothing has been forgotten in the equipment of the new Ross, the list of articles including a motor-driven horn, one-man top, Stewart speedometer, ammeter, demountable rims and the usual complement of tools.

## Central Control of Municipal Vehicles Milwaukee Believes This Will Result in Greater Efficiency

MILWAUKEE, Wis., June 30—Central control of municipally-owned motor vehicles by a division of the present city government is under consideration in Milwaukee as a result of a survey made by the citizens' bureau of municipal efficiency, which finds that the use of motor cars for municipal work has grown so rapidly that its extent is hardly appreciated and heavy losses are resulting from the lack of co-ordination of activities.

During 1915 the total amount expended for repairs on municipal cars was \$28,700, distributed among forty-seven cars of fourteen different makes. Five have already been added this year and money for three more is available, so that the total number of cars for 1916 will be fifty-five. This number does not include any of the vehicles in the service of the fire or police departments, and with these the city of Milwaukee owns more than 115 cars.

The efficiency bureau recommends the organization of a central garage force, with a superintendent working under the direction of the superintendent of public

buildings and grounds, department of public works. In this manner, it is contended, control of all municipal cars and chauffeurs would be transferred to the division of motor vehicles and assigned to various departments. The purchase of new cars would be in charge of the superintendent of buildings and grounds.

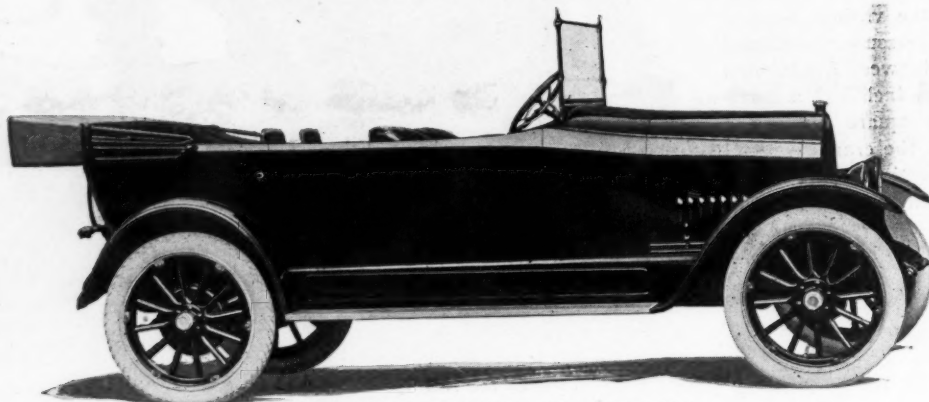
"The lack of central control or of any uniformity in the character of cars doing the same kind of work shows very clearly in the cost of maintenance and repairs," the report says. "Tire costs are especially interesting in that, under similar condition, the mileage cost of tires ranges from 5.4 cents to 8.7 cents."

Criticism is directed at the manner of handling drivers and the great amount of idleness the present system, or rather lack of system, permits.

The use of motor vehicles for city work has grown so rapidly, it is stated, that the vastness of the city's motor business is not appreciated, but it is high time that organization for economy and efficiency be undertaken.

## Jeffery Four Price for 1917 Increased \$95

Roll-Edge Body—No New Changes Made in Chassis  
Detail—Now Sells at \$1,095



*The roll-edge body is found in the Jeffery four*

**T**HE Thomas B. Jeffery Co.'s 1916 four is continued for the coming year with no changes in the chassis, a price increase of \$95, the new car selling for \$1,095, and a new body which gives the car the trade name of the roll-edge four. A new cellular radiator is the only other change.

The roll-edge four comes upon the demand of Jeffery dealers who have been insistent since the six was announced last January with a roll-edge body, that the four be furnished them in the same style, according to the announcement of the factory.

A particularly noteworthy feature of this new Jeffery body is its unbroken lines from the radiator to the rear seat and between fenders. The roll-edge on the top of the body blends into the hood without any break whatever from the straight-line effect, making the car look exceptionally long and clean.

The divided front seat feature which was a part of the 1916 body design is continued without change.

In general the new four has a 3¾-by-5¼-inch block motor, disk clutch, three-speed gearset, and semi-floating axle. The wheelbase is 116 inches and the tires 34 by 4. Practically every part of the car is Jeffery built.

The new bodies are finished in Savoy green with a fine gold stripe; fenders and running gear black, and the wheels green with a gold line. Upholstery is in black leather with deep double-deck springs.

### MAKES UNIQUE MOTOR VEHICLE

Bloomington, Ill., June 30—Orville Eckhardt, a farmer of Macon, Ill., has designed a car which is entirely original. He frankly confesses that his car was assembled but it was assembled from parts that were never meant to go together. He



*Front view of the Jeffery four, which sells at \$1,095*

first secured a 2-horsepower engine with a broken frame. The break was repaired with two iron clamps and the engine ran successfully. From the scrap heap he brought a discarded mowing machine with two wheels. From the same scrap pile he secured a pair of smooth iron wheels and an axle. A stout wooden frame was next constructed which he mounted upon the mower wheels, with the other pair in front as guides. A sprocket wheel upon the engine shaft was connected by a chain with a sprocket wheel on the pitman shaft of the mower.

Since the drive wheels of the mower furnished the power which turns the pitman shaft, the pitman shaft driven by the engine transmitted the power to the drive wheels. There is a steering column which looks as if it might be an old brake wheel with part of its rod. The steering

column operates the steering gear by means of a sprocket chain. The outfit will run and will pull a considerable load.

One day it pulled a buggy with a number of people in it. This was a joke trip. The machine is equipped with a sprocket wheel on the engine shaft which carries a broad-faced pulley, enabling the engine to be belted to a cider mill, corn sheller, pump, grindstone, etc. It can travel anywhere upon its own power and is handy in carrying supplies to the orchard or barn and is put to a variety of uses by its ingenious owner.

### OIL MEN IN MEXICO

Tampico, Mexico, June 30 — American oil interests here are very apprehensive that attempts may be made to destroy their properties should the strained and warlike relations between Mexico and the United States continue much longer. Open threats have

been made by officers of the Carranza army that they intend to lay waste the American-owned oil fields of this part of the country should there be war declared. Activity in all of the fields of the Gulf coast region has practically ceased, although the few larger wells continue to flow and the pipe line runs have not been severely interrupted.

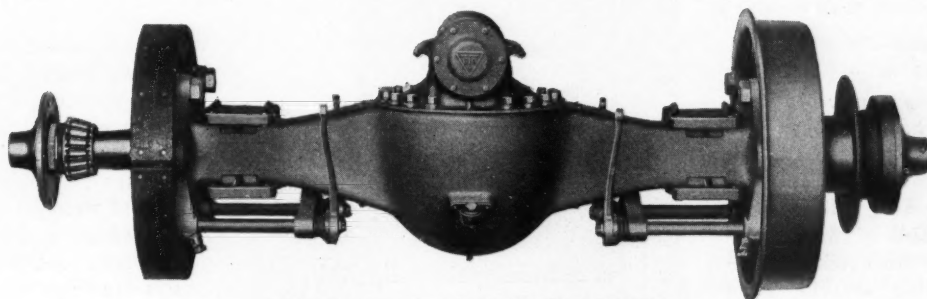
The refineries are also in full operation. Most of the American employees of the different producing companies have come into Tampico for refuge, pending an outcome of the existing critical situation in this territory.

There are a few of the more venturesome American drillers, however, who are still in the oil fields and who have so far refused to be frightened by the stories of what may happen to them should the two countries go to war.



# Timken Introduces 5-Ton, Worm-Driven Rear Axle

## New Unit Is Largest Drive of This Type So Far Produced



*Timken's newest and mightiest truck axle*

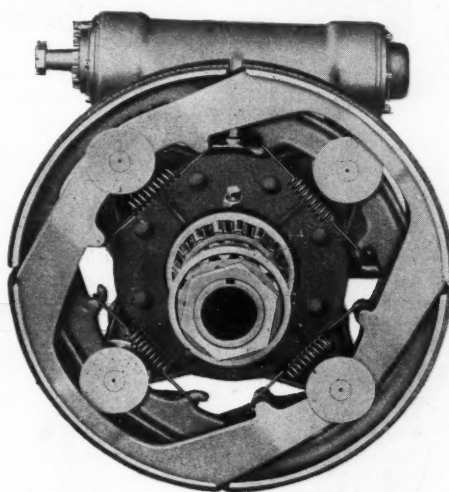
UP to this time the popular sizes of worm-driven truck axles have been within the range from  $\frac{3}{4}$ -ton to 3-ton. There has been a growing demand for this type of drive in larger truck units, and to meet such the Timken-Detroit Axle Co., Detroit has come out with a 5-ton unit that has long been in the process of development. This new Timken product is doubtless one of the largest axle types of the worm-driven form yet produced, and it speaks eloquently of the ability of the engineers who are responsible for its design.

This new axle has a pressed-steel housing of great strength, and is equipped with the Timken-David worm gearing with Timken roller bearings. The worm is mounted over the wheel, and throughout the construction is typically Timken. That a large factor of safety has been used is evidenced from the fact that the axle is capable of carrying on the rear tires a weight of 15,000 pounds.

### Load-Sustaining Portion Continuous

The load-sustaining portion is continuous from spring seat to spring seat, and is a pressing 6-inch square at either end under the spring seats, and enlarges to a spherical shape in the center to provide clearance for worm gear and differential. The square section at the ends has been used in order to give a firm seat for the spring saddles and added strength where it is needed. The center is open at the top for the attachment of the carrier flange which holds the worm shaft and its bearings, the worm gear, differential and bearings being in one complete unit. The ends of the housing are flanged to a large diameter and the brake spider is riveted to this flange substantially.

The axle is designed as a floating unit, and the wheel bearings are mounted on chrome-nickel steel tubes which extend inwardly toward the worm almost to the differential bearings, thus making a sturdy mounting for the shafts, the bearing supports being filler pieces welded and riveted to the housing, and the tubes forced into these filler pieces under great pressure. Thus the axle has a truss or bridge con-



*The Timken 5-ton rear axle is designed as a floating unit*

struction, this being the strongest type.

Brakes are 24 inches in diameter and 4 inches wide and are of the internal duplex form. Substantial flanges on the drums provide against distortion. Axle shafts are  $2\frac{1}{4}$  inches in diameter.

### PREDICTS PUBLIC-SERVICE JITNEYS

Milwaukee, Wis., June 30—That the jitney bus eventually will force the electric companies to discontinue urban service and confine electric car service to interurban traffic, was the prediction made at the first annual banquet of the Milwaukee Independent Jitney Association and Automobile Mutual Liability Company, by Frank J. Weber, business agent of the Milwaukee Federated Trades Council. The event was in celebration of the first anniversary of the appearance of the jitney bus on the streets of Milwaukee.

"Inside of 25 years, street cars will have been wiped off the streets of Milwaukee by the jitney bus," said Mr. Weber. "Electric cars will be operated only on interurban lines. Motor buses will do the work in the city. When the jitneys become powerful, the traction companies will dispose of their electric cars and seek control of the jitneys. It has been done in England. There is already some talk of public service cor-

porations going into the motor bus business in the west."

It was stated at the banquet that a nation-wide, organized attempt was made to make the operation of jitney buses impossible. The attempt was made in Wisconsin, it was stated, but the same legislation that restricted the jitney business also placed it on a firm and solid foundation. It is a matter of fact that Milwaukee is one of the few examples afforded by large cities of America where the jitney bus business is thriving, although under severe restrictions.

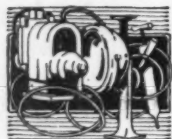
### STOVER HAS SEMI-DEISEL ENGINE

Freeport, Ill., June 30—A new engine has been added to the list of the Stover Tractor Mfg. and Engine Co. It is known as a four-cycle, semi-Deisel crude oil machine and is an entirely new departure. William F. Freitag, superintendent, is the designer. So perfect were his plans that the first engine constructed worked smoothly and without any changes. This type of engine has been manufactured in Europe for several years but American manufacturers have been chary of it. This made it necessary for Freitag to do considerable experimenting before his working model suited him. The engine is in demand in large sizes for irrigation purposes in the semi-arid sections of the west and also for municipal electric light and water works plants. The engine is designed to burn crude oil. With gasoline continuing high in price, there is a demand for an engine which will burn oil that is unrefined.

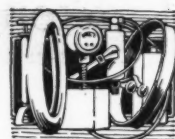
### MAY EXPORTS FROM NEW YORK

New York City, June 30—May exports from this city of cars and parts and tires totaled \$8,501,163, as compared with \$8,120,672 in April. Cars and parts valued at \$7,146,232, were exported in May, while the exportation of tires totaled \$1,354,931.

Up to the week ending June 17, exports from this port amounted to \$6,934,264, divided into \$2,917,517 for commercial vehicles, \$1,700,239 for passenger cars, \$1,251,161 for parts, and \$1,065,347 for tires.

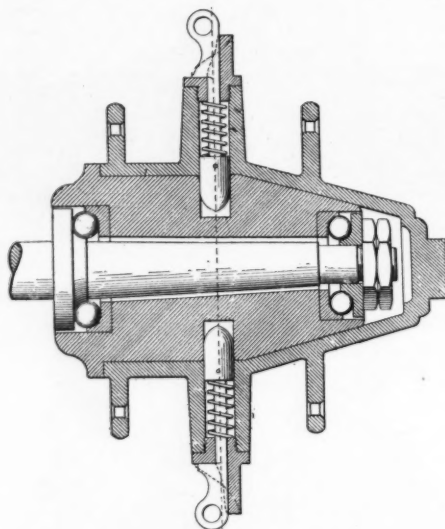


# The Accessory Corner



## Novel Demountable Wheel

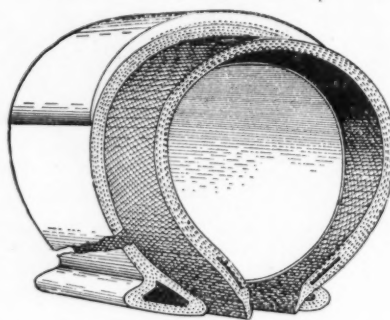
A demountable wheel of entirely new principle than has heretofore been placed on the market has just been patented by John Kelly, Chicago, Ill., although it is not yet on the market. The device consists of an inner hub and an outer hub—the inner hub of which contains in its periphery diametrically opposed, radially extending sockets. The sockets are provided for the reception of interlocking members, carried by the outer hub section causing the two sections to rotate together. To release the outer hub, it is only necessary to turn the plungers on their axis which causes the shoulders to ride upon the cam surfaces thus withdrawing the heads of the plungers from the sockets. A glance at the accompanying illustration will make this construction clear.



Recently patented demountable wheel

## A Rim Gripping Sub-Casing

The Fisher Sub-Casing Co., 5048 Lake Park Ave., Chicago, is marketing a rim-grip, sub-casing designed to hold rim cuts and prevent blow-outs. The sub-casing which is placed inside the tube is supported by flexible steel rims which are endless and are made conical to fit against the inside of the outer tire at the bead. These steel rims are located below the place where tires ordinarily rim cut so that there is no chance for the sub-casing to be forced through the rim cut, thus the reliner is supposed to act as a positive retainer for the inner tube even though the outer casing is badly rim cut. The sub-casing for a 33 by 4 tire costs \$7.80 and other sizes are in proportion.



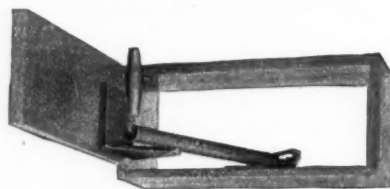
Sub-casing which grips the rim

## National Mix-O-Lock

A gasoline saver, primer, carbon remover and lock for Ford cars, all combined in one device, which consists of a flange which bolts between the carburetor and the intake, is marketed by the National Motor Supply Co., Cleveland, O. There are no holes to be drilled or tapped; all that is required is a wrench. It contains an automatic valve which admits more air when required and has a plug which may be removed, thus preventing the starting of the motor, as the absence of the plug renders it impossible for gasoline to be sucked from the spray nozzle. The price is \$2.

## New K-W Magneto

The new model T K-W magneto is an independent, high-tension magneto built especially for automobile and aeroplane motor. It is made by the K-W Ignition Co., Cleveland, O. It operates on the well-known inductor principle, having stationary windings and revolving rotor. It will give a spark of great intensity at speeds as low as 60 r.p.m., it is said. This type



Holder to prevent garage doors from slamming

of construction does away with all moving wires, special contacts, etc. The circuit breaker is claimed to be unusually fast and tests have been made up to 18,000 sparks per minute without missing. This is the equivalent of operating a 12-cylinder motor at 3,000 r.p.m. This model conforms to all standard dimensions, it is entirely enclosed and is fully protected against dirt, water and oil. The Model TK is identical except that it is equipped with an impulse starter. Prices, Model T, 4-cylinder, \$50; 6-cylinder, \$52.50; 8-cylinder, \$55; 12-cylinder, \$60. Model TK, 4-cylinder, \$55; 6-cylinder, \$57.50.

## Stanley's New Garage Hardware

One of the novel items included in the new garage hardware catalog issued by the Stanley Works, New Britain, Conn., is the new garage door holder. The Stanley

Works considered that a door left free to swing on hinges is liable to slam shut from a sudden gust of wind possibly injuring a car or breaking glass. To provide a means of avoiding this, the door holder has been devised which consists of an arm of wrought steel, one end of which is pivoted on a plate attached to the top of the door. As the door opens, the steel arm is drawn through a slot in a bumper which is attached to the top of the door frame. The top end of the bar is turned up and at the end of it on the under side are two notches. When the door is open over 90 degrees, the bar is pulled through the plate to a position where the turned up top piece hits the bumper and the notches drop to the bottom edge of the slot, thus checking the motion of the bar and consequently the door in both directions. To release the door it is only necessary to pull a chain which lifts the notched arms over the slot permitting the bar to slide and the door to swing.

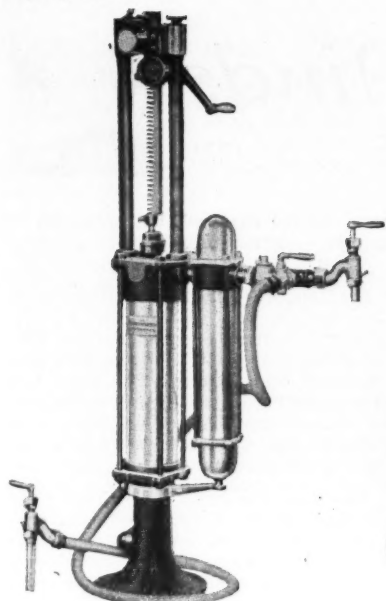
## Motor Restaurant

The Icy-Hot Bottle Co., of Cincinnati, has just begun to make a new style of luncheon outfit known as the Motor Restaurant. The set contains plates, knives, forks, napkins, cups, spoons, jelly jar and a large lunch box in the upper section. The lower half of the case contains three divisions, two for vacuum bottles or jars and the other for fruit, crackers, cake, etc. There is a division above for an icy-hot jar so that three vacuum containers can be carried. The new models made for parties of four or six have cases of basswood. The box is 12 inches high, 15½ inches wide and 9¼ inches deep, finished in black patent leather and impervious to water.

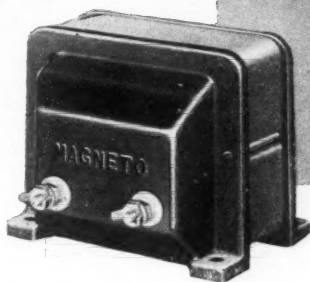
## Fire-Proof Pumps and Tanks

The Advance Pump and Tank Co., St. Louis, Mo., is marketing a line of gasoline, kerosene and oil filling stations, pumps and underground and above ground tanks which are claimed to be fire-proof. The No. 41 standard pump which is illustrated on these pages is a long distance, gallon stroke, self measuring pump for gasoline, kerosene or oil. It may be located in or outside of the building any distance from within 150 feet of the tank which is generally placed about 30 inches underground or in the basement. It is equipped with a 10-gallon discharge register and anti-drip faucet. The cylinder is constructed of heavy seamless brass, the valves are a special composition of metals, non-corrosive and supposed to be more durable than brass. It requires three rotary motions of the handle for 1 gallon. The tanks are constructed to meet the requirements of insurance underwriters and are painted with two coats of asphaltum paint, have three

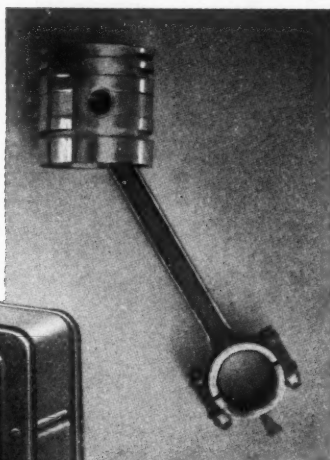




Advance garage pump



Transformer to regulate Ford lights



Aluminum alloy piston and connecting rod

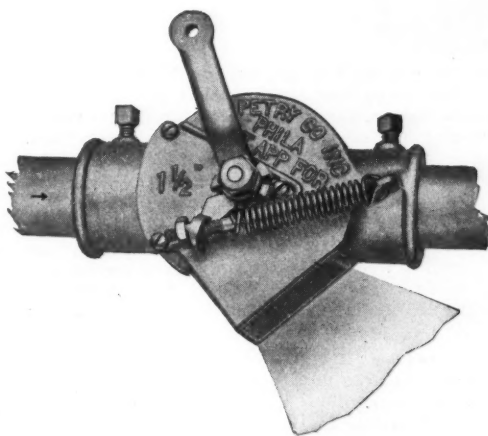
flange openings, a 1-inch vent pipe, 2-inch filler pipe, and a supply pipe with a tank connection. The filler pipe is constructed with a screened vent to allow the liquid to replace the air and in the filler pipe there is inserted a metal tube with 2 V-shaped screens to prevent sediment from entering the tank. These tanks are made with 30-gallon to 15,000-gallon capacities. Other products of this company are pump batteries, for various kinds of oils and liquids, wheel tank for garage use and roadside filling stations.

#### Transformer for Light Regulation

The Waynelite is a small transformer perfected by the General Electric Co., and now being marketed by them, designed to steady the headlight illumination of Ford cars. It receives current from the magneto included in the motor and delivers this current to the headlamps, which are wired in multiple instead of in series as is the usual way. Such wiring prevents the possibility of both lamps going out which is the case with the ordinary series winding. It is claimed that tests show that the new transformer furnishes a steady light at all speeds above 10 miles per hour. The installation is simple, it only being necessary to substitute 6-volt lamps in place of 9-volt lamps, attach the present headlight wire to one of the magneto terminals of the Waynelite and ground the other magneto terminal to the engine frame. A pair of wires, each connected with a headlight extends to two terminals of the transformer. The Waynelite may be placed on the dash, or under the hood or floor boards, wherever it is most convenient.

#### Aluminum Pistons and Rods

An aluminum alloy known as Almaco is used in the construction of the pistons and connecting rods now being marketed by the Aluminum Mfg. Co., Des Moines, Ia. The Almaco pistons have cast in them fins running from the piston head to the base. These fins are designed to carry the heat generated by the explosion away from the



Muffler cut-out with an adjustable lever

piston head and distribute it to the sides of the pistons where it is absorbed by the cylinder walls and taken care of by the water cooling system. It is claimed that the construction reduces the deposit of carbon. The connecting rods weigh less than one-third as much as cast iron or steel, it is claimed.

#### Windshield Cleaner

Clear-O-Scope is the name of a simple device which has been brought out by the Clear-O-Scope Co., 738 W. Madison St., Chicago, for cleaning the windshield when driving in rain, snow or fog. As will be seen from the illustration, the appliance

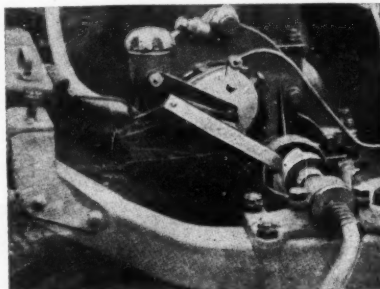
is slipped over the top of any standard make of windshield and left there for immediate use when needed. It is made of steel wire and rubber tubing is slipped over this wire to afford cleaning surfaces. The price is \$1.

#### Prevents Back Kicking in Fords

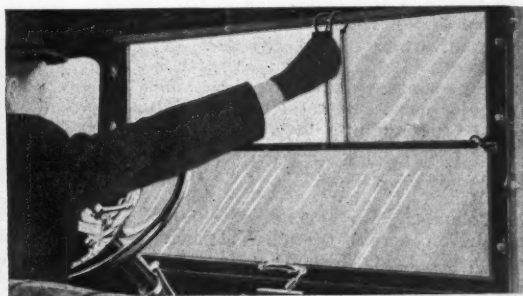
Witherspoon Jeffords, Florence, S. C., is the distributor for an automatic safety set for use on Ford motor cars. With the device attached the spark is automatically retarded while the engine is being cranked, thereby preventing back kicking and possible injury to the operator if he has neglected to retard the spark before cranking. The safety spark set also prevents the spark lever advancing from vibration while the engine is being cranked. To apply the device to a Ford car it is only necessary to remove the commutator case from the engine in the usual manner and fasten a spark set to it with a single set screw. It is only necessary to drill one hole to make the installation. A ratchet design to work in conjunction with the regulating lever on the spark set is inserted in place of the ordinary ratchet. When the spark lever is improperly set, the lever locks in a notch in the ratchet and when the motor is turned one-half a revolution, this lever releases causing the spark to retard. A complete set ready to install costs \$4.

#### Adjustable Lever Cutout

A cutout designed to make a positive cutoff from the muffler discharging the gas outward at an easy angle through an opening much larger than the area of the exhaust pipe has just been introduced by N. A. Petry Co., Inc., of Philadelphia. The valve in this new device may be readily taken out by unscrewing the side plate on the lever side without detaching the cut-out. The lever is readily adjustable by unscrewing the nut on the valve shaft, lifting up the lever and placing the lug in the required slot for the position desired. This allows meeting conditions for attaching and does away with the use of unnecessary cables. The closing spring has an easy action, and in order to overcome friction of the peddle or other attachments, the spring tension is readily adjustable by simply turning a nut which is automatically locked in position. With exhaust having an outside diameter including  $1\frac{1}{4}$  to  $1\frac{3}{4}$  inches, the price is \$3;  $1\frac{3}{8}$  to  $3\frac{1}{2}$  inches, \$3.50;  $2\frac{3}{8}$  to 3 inches, \$4.



Automatic device to retard Ford spark lever



Simple windshield cleaner that is designed to fit any car



# From the Four Winds



**OLD HAYNES NOW PAINTER'S WAGON**—James G. Prosser, St. Louis, Mo., has one of America's oldest cars, although probably not the earliest. He believes he has the oldest car now in service. This car, which is shown above, is a Haynes of the 1898 variety. He bought it when it was 10 years old for \$150, and has used it continually since that time, having made one trip from St. Louis to Chicago in it. The only changes made are the steering apparatus and a new radiator. Prosser hopes to be the one who gets the new Haynes twelve that is being offered to the one having the oldest Haynes.

**NO Trailer Fee Necessary**—It has been decided by the Secretary of State of Washington, that no license is needed for a motor car trailer. Licenses are needed for a motor vehicle only and trailers are free.

**California Has 184,624 Cars**—California's total registration of cars for the present year to June 15, is 184,624. The receipts from the registrations of these cars give the State a total of \$1,868,697 and the 1,246 dealers have paid into the State treasury \$31,445. California has received since Jan. 1, \$17,260 from 9,453 registered chauffeurs.

**Prizes for Best Roads**—A system of grades on which to award prizes for keeping dirt roads in repair is being worked out by officials of the Cuyahoga County Efficiency League, Cleveland, O. This league is composed of officials of all the townships, villages and municipalities in the county, especially those having charge of the road work. The Cleveland Automobile Club has offered prizes of \$100 to the community that shall show the greatest efficiency in keeping its roads in good condition the present season.

**Motors Hurt Rail Revenues**—Use of the motor car is charged by the Northern Pacific railway report for less than the normal increase in passenger traffic revenue. The report is for 10 months ended May 31. Instead of a normal increase it was only 1.2 per cent, while freight revenues grew 26.4 per cent. It is cited that farmers and other persons are traveling more than ever by motor car. The total passenger revenue for the period was \$12,433,301, a gain of only \$143,599.

**Fifty Years Ago**—Just 50 years ago Mr. and Mrs. T. E. Jennings, Nebraska, crossed the Columbia river at The Dalles, Ore., having driven across the plains in a prairie schooner. Last week they crossed again but this time in motor car with all modern accessories and comforts. "Fifty years ago," said Mr. Jennings, "we took more than 6 months to make the trip from the Middle

West and this time we have made it in less than 3 weeks. On our last trip we experienced many hardships and were beset by hostile Indians and on this one we found modern hotels and white men."

**Kansans Don't Register Cars**—Kansas county clerks find that motor car owners are not as punctilious about turning in their cars for taxation as they are about securing licenses. Many clerks reporting say that the number listed for taxes is about one-third short of the number of licenses in the counties. It is possible that some steps may be taken to get the missing cars on the books.

**194,000 Licenses in Ohio**—According to a report made public by Ohio Registrar of Automobiles W. H. Walker covering the present year up to June 21 there has been 194,000 licenses issued to owners of gasoline automobiles. The number of electrics which have been registered is 4,150. Manufacturers and dealers to the number of 2,750 have been registered in that period. It is estimated that

more than 230,000 cars will be registered by the department if the present rate is maintained.

**Illinois Licenses Pass 200,000**—Illinois license No. 200,000 was issued June 17, according to the 6-months statement by Secretary of State Stevenson. During 1915 only 175,000 licenses were issued. The total 1915 revenue was \$924,905, of which \$750,000 was collected during the first 6 months. This year \$1,000,000 was reached well before the end of the first 6 months.

**May Abandon Eastern Dixie Tour**—The proposed tour of the officers and commissioners of the Dixie highway over the eastern branch of the highway next October may be abandoned unless the condition of some of the roads which are part of this line is much improved. W. S. Gilbreath, field secretary of the Dixie Highway Association, announced at Lexington, Ky., last week, after a tour over the roads.

**Dunkards Rule Against Motors**—The national convention of Dunkards, a strict religious sect, held at Fairview, Mo., recently, decided that members must not own motor cars, as they created pride and were a cause of dissension. An indication of the trend towards leniency and modern ideas of the sect, however, was the decision that members might, in certain emergencies, hold office of school director in counties or cities.

**First Car Through Snoqualmie**—After bucking snow drifts for 7½ hours, from 1 mile west of the summit to Keechelus inn, the first car to make the Snoqualmie pass trip across the Cascades under its own power has reached Cle Elum, Wash. It was not thought possible that any car could negotiate the slide near Lake Keechelus for weeks, but it was successfully accomplished by Dr. W. M. Richmond of San Francisco.

**Price Active in Ohio A. T. A.**—Since the resignation of A. J. Peebles, as secretary-treasurer of the Ohio Automobile Trade Association, Columbus, O., F. T. Price has assumed the duties of secretary in addition to that of president. He has resigned his business connections and will devote his entire time to organization work.



**FOUR QUEENS IN A KING**—In a parade recently held at Vicksburg, Miss., a King eight, owned by Mrs. E. L. Brien won first prize for being the best decorated. The decoration was done by Mrs. Brien and her friends in the car.



## Good Roads Activities

**Route Open to Lake Tahoe**—With the opening of the Lincoln highway to Lake Tahoe, Cal., the road now being clear of snow, tourist traffic has started with a boom. The first Sunday the road was reported passable, a local hotel reported 180 visitors at meal time.

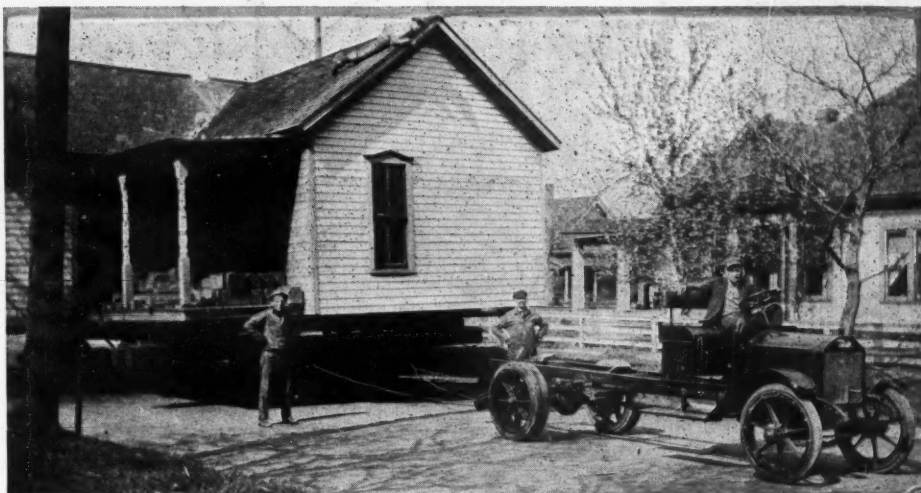
**More Spartan Sign Posting**—The campaign of sign-posting on the highways of the United States which familiarized motorists with the slogan "Safety First, Sound Spartan," will be resumed this year. The Spartan sign car will start in a few days and will work through the East.

**Illinois County to Ask Bond Issue**—The Roads and Bridge Committee of St. Clair county, Ill., across the Mississippi river from St. Louis, Mo., has served notice on the board of supervisors that it will ask an election in November for \$1,500,000 of bonds for building rock roads in the county.

**Road Fund Increased**—The government has made a further allotment to the Crystal-Silver road project, which has been under construction by the Forest Service between Crystal Springs and Mt. Ida, Arkansas, for several weeks. The main road from Hot Springs to Mt. Ida is through the Arkansas National Forest.

**Bond Issue for Missouri County**—The citizens of Clay county, across the Missouri river from Kansas City, Mo., voted June 24 in favor of an issue of \$1,250,000 of bonds to build a complete system of rock roads through the county. The Motor Car Dealers' Association of Kansas City, and many members of the Automobile Club, helped materially in the campaign. The proposed roads connect with several interstate and national highways.

**Lincoln Highway Improvement**—As a result of the consistent efforts of A. A. Moore, Lincoln Highway Consul at Marshalltown, Ia., and other good roads advocates, the city has decided to hard surface the route of the great highway in its entirety within the city limits. Paving the Lincoln Highway will be the biggest job undertaken by Marshalltown during the coming year and the cost, together with some additional paving which is to be done, will run something like \$96,000. Fishing parties are using the Lin-



**MOVING A HOUSE BY TRUCK**—Rex Bell, Pittsburg, Kan., was driving a Dart Model-CC 2 to 2½-ton truck when he came to a street where they were moving a four-room house with two porches and a pantry. It was directly across the street so he could not get by, so he inquired of the house mover how long he expected to be there. The house mover said he didn't know; that he had been 2 hours moving the house two blocks by means of horses, blocks and pulley drums. Mr. Bell told him that as he was going in the same direction he would take him. Of course this seemed a huge joke to the house mover. He didn't think it possible for Mr. Bell to pull him, but he backed up to the house and hitched directly to it, and without the use of any pulleys, pulled him twelve blocks, around one corner, over rough pavement, and up a small grade in fifteen minutes' time.

coln highway in reaching the lakes and streams in the Sierras, and are reporting excellent catches. Thousands of visitors are expected along this part of the route during the year.

**Borderland Trail Popular**—Tourist travel to and from the West via the Borderland route is showing a steady increase, notwithstanding the fact that the Mexican troubles have caused many people to forego their plans to make their journey through New Mexico and Arizona. The dangers are entirely mythical. The highway is in much better condition than it was last year when it was driven by great numbers of tourists. The garage facilities have increased and are of a better standard than the ones that were originally established along the route. It is now possible to make many side trips over good roads.

## With the Motor Clubs

**Worcester Club Information Bureau**—The Worcester Automobile Club, Worcester, Mass., plans to increase its membership and also for a big outing to be held soon at one of the nearby resorts. The club plans an information bureau for members and visiting motorists.

**Ottawa Organizing Club**—Steps have been taken for the formation of an automobile club with a preliminary membership of 100 in Ottawa, O. Officials of the Toledo Automobile Club are aiding in the organization, which will affiliate with the Ohio Automobile Association.

**Ohio Has New Motor Club**—The Wayne County (Ohio) Automobile Club has been re-organized with several score of motorists as enthusiastic members. Walter G. Whitaker was elected president, succeeding D. J. Foss. A. N. Brenneman was elected vice president; George Quinby, secretary, and C. P. Blough, treasurer.

**Webster Club Elects**—At a meeting of the Webster, Mass., Automobile Club last week officers were elected and plans made for widening the activities of the club. The officers chosen were Dr. Edward Frissel, president; Louis E. Pattison, first vice-president; Judge Frank F. Russell, second vice-president; Leon J. Kreft, secretary; Patrick Prout, treasurer.

**Columbus Club Has Outing**—More than 2,000 people attended the annual outing of the Columbus, Ohio, Automobile Club, which was held recently at the Bismarck Grove, about 20 miles from the Buckeye capital. The day was spent in games and athletic events. It was one of the most successful outings of the club, according to President C. C. Janes.

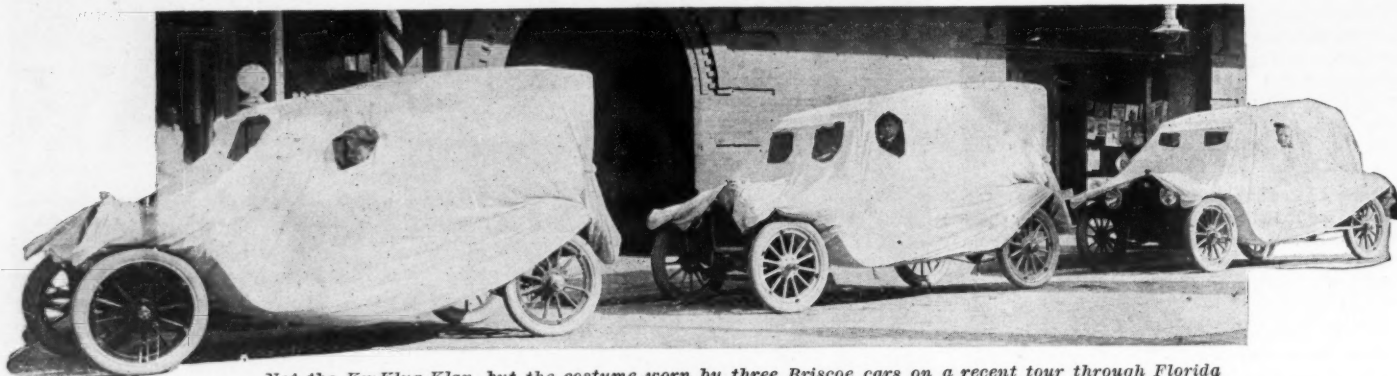
**Boston Club Elects**—The annual meeting of the Metropolitan Motor Club of Boston, Mass., was held last week at the Boston Art Club and the officers elected were: Hon. Samuel L. Powers, president; Charles E. Hatfield, vice-president; A. F. Clarke, treasurer; James Fortesque, secretary and assistant treasurer. Mr. Fortesque was also chosen a director for the club in the Massachusetts State A. A. The treasurer's report showed the club was in a fine condition.



**SAFE DEPOSIT FOR MOTOR CARS**—The Kay-Ess Garage, Los Angeles, Cal., has introduced a system of steel lockers for storage purposes which is proving very popular with owners. The safety storage cage insures the owner against joy riding by either employees of the garage or members of the family, without the consent of the owner and prevents accident from cars driven by careless motorists or employees in the garage. The storage plan is popular with owners also who work on their own cars as the machine can be taken down and parts left on the floor with perfect safety.



# Among the Makers and Dealers



Not the Ku-Klux-Klan, but the costume worn by three Briscoe cars on a recent tour through Florida

**Sparton Factory Addition**—Work is being rushed on the new factory of the Sparks-Withington Co., Jackson, Mich., which, when complete, will duplicate the present plant and nearly double the production of Sparton safety signals.

**Gibson Co.'s New Building**—The Gibson Co., Indianapolis, Ind., accessory dealer, will erect a five-story service and sales building which will be one of the most modern of its kind in the middle-west and will represent an outlay of approximately \$400,000.

**Elliott Haynes Production Manager**—E. M. Elliott, formerly in charge of the production of the United Motor Truck Co., Grand Rapids, Mich., and since then in charge of sales of the Mals trucks, has been made production manager of the Haynes Automobile Co., Kokomo, Ind.

**Theater Party if Mark Is Reached**—A rather novel method is used to keep up the esprit de corps of the factory organization by the Auto Parts Mfg. Co., Milwaukee, Wis. A certain mark is set for value of total shipments of the given month and if this mark is reached employees are given a theater party.

**Westcott Adds to Organization**—With the removal of its factory and general offices from Richmond, Ind., to Springfield, O., the Westcott Motor Car Co. announces several additions to its organization. Allen H. Frost has become manager of the service depart-

ment. He formerly was connected with the service divisions of the Packard and Oakland companies. J. M. Rehe, Springfield, has been appointed auditor and J. B. Boyle, who has been in the employ of the Westcott company for several months, has been placed in charge of the traffic and order department.

**Perfex Radiator Adding**—Ground has been broken for the new plant of the Perfex Radiator Co., Racine, Wis., which established a factory in quarters leased about 4 years ago for the production of radiators for passenger and commercial cars, trucks, tractors, etc. The main building will be 85 by 250 feet.

**Pioneer Dealer Joins Ross**—C. Arthur Benjamin, Syracuse, N. Y., has been appointed sales manager of the Ross Automobile Co., Detroit, Mich. Benjamin was one of America's first motorcar dealers. He took the Stanley steamer agency at Syracuse in 1898, and his sample car was the twenty-eighth delivery by that company.

**Renner Heads Chicago Manzel Branch**—Robert C. Renner, who has been connected with Manzel Bros. Co., Buffalo, N. Y., has opened a branch and service station for that company at 1004 Michigan avenue, Chicago.

**Corliss Truck Co. Formed**—The incorporation of the Corliss Motor Truck Co., Corliss, Wis., presages the establishment of a large commercial car factory at Corliss, in the

plant formerly occupied by the defunct Wisconsin Engine Co. The corporate articles are signed by members of a law firm of Milwaukee, which claims it is not quite ready to announce its plans.

**Farasey Makes Change**—George F. Farasey, with the Kelly-Springfield Tire Co. at Boston and Cleveland, has taken charge of the St. Louis branch for the same company, succeeding C. R. Higgason.

**Trailers for French Army**—The announcement is made that the Troy Wagons Works, Troy, O., makers of trailers, has booked an order for 200 trailers, equipped with brakes, rubber tires and special bodies, from the French government for war purposes. The order calls for \$413,000.

**Flint Heads Wilson Sales**—Herbert J. Flint has joined the J. C. Wilson Co., Detroit, Mich., as general sales manager, and will have full charge of the distribution of the Wilson truck. Mr. Flint was eastern sales manager for the Smith Form-a-Truck.

**New Company Adds to Plant**—Less than 6 months old and already erecting an addition to its present plant is the record of the General Tire & Rubber Co., Akron, O., the city's newest rubber factory. This company formerly was located at Kansas City, Mo. Tire accessories and a few rubber specialties were the principal products, the company being in this line of manufacture for about 7 years.

**Akron, O.**—A new rubber company is soon to start manufacturing in this city. The Supreme Rubber Company with an authorized capital of \$25,000 has been chartered by George L. Curtiss, Max Read, E. L. Teits, T. J. Seibert and others.

**Cincinnati, O.**—A. Bernstein Tire Co.; capital stock, \$10,000; to deal in tires and accessories; incorporators, Abraham Bernstein, Fanny E. Bernstein, Max Bernstein, H. A. Epstein and Jacob J. Risch.

**Cleveland, O.**—Brooklyn Garage Co.; capital stock, \$15,000; to operate a garage; incorporators, William O. Thewes, W. E. Roo, George N. Marks, F. H. Reed and Lawrence J. Nixon.

**Cleveland, O.**—King-Cleveland Co.; capital stock, \$25,000; to deal in automobiles and parts; incorporators, Carl F. Shuler, C. E. Curphey, E. E. Kinnison, L. Griffiths and C. Murman.

**Cleveland, O.**—The Glove-Gibraltar Rubber Company has been incorporated with a capital of \$25,000; to deal in tires and other rubber articles; by Herbert Kimmel, William I. Truby, L. H. Stockton, John P. Stockton, Jr., and John T. Kimmel.

**Columbus, O.**—The Vom Motor Truck Sales Co.; \$10,000; to deal in trucks and operate a repair shop; J. Walter Baker, Fred Norton, Fred M. McSweeney, William K. Williams and J. L. Murray.

**Denver, Colo.**—C-B Auto & Service Co.; to sell and rent cars; capital stock, \$5,000; incorporators, W. C. Borah, C. A. Harman, E. N. Harman.

**Dover, Del.**—Hawley Motor Car Co.; to engage in the manufacture and sale of motor vehicles of all kinds; capital stock, \$50,000; incorporators, F. D. Buck, G. W. Dillman, K. E. Longfield.

**Columbus, O.**—Vim Motor Truck Sales Co.; capital stock, \$10,000; incorporators, J. W.

## Recent Incorporations

Baker, Fred Norton, F. M. McSweeney, W. K. Williams, J. L. Murray.

**Covington, Ky.**—R. B. Hume Automobile Co.; capital stock, \$15,000; incorporators, A. B. House, John L. Leasing, B. B. Hume, John Keller, T. C. Reepess, F. J. Hanlon and J. F. Piener.

**Fremont, O.**—The Jackson Garage Co.; capital stock, \$10,000; incorporators, John M. Cherry, Chris Wehl, Clarence H. Fruth, Frank L. Adler and John C. Fouth.

**Fremont, O.**—Jackson Garage Co.; capital stock, \$10,000; to operate a garage; incorporators, John M. Cherry, Chris Wehl, Clarence H. Fruth, Frank L. Adler and John C. Fruth.

**Joliet, Ill.**—Motor Products Corp.; capital stock, \$10,000,000; incorporator, C. F. Jonsen.

**New York**—Hudson Auto-Body Corporation; to manufacture motor car bodies, repairing, etc.; capital stock, \$500,000; incorporators, E. E. Harvey, F. Gurney, M. Civir.

**Portland, Me.**—Detroit Weatherproof Body Co.; to manufacture and deal in bodies, curtains, tops, windshields, etc.; capital stock, \$750,000; incorporators, A. F. Jones, T. L. Croteau, A. B. Farnham, J. P. O'Donnell.

**Springfield, O.**—The Ayto Signal Co.; \$10,000, to manufacture accessories; E. C. Price, A. H. Odell, H. E. Moffett, S. L. Price and N. Odell.

**Toledo, O.**—Ohio Valley Mfg. & Sales Co.; capital stock, \$30,000; incorporators, H. W. Rahm, Leo Rahm and W. P. Busshard.

**Tompkinsville**—John D. Killian Auto Co.; storage house, garage, motor vehicles; capital stock, \$40,000; incorporators, J. D., A. E. and A. A. Killian.

**Trenton, N. J.**—Detroit Tire Co.; to manufacture and deal in motor car accessories; capital stock, \$10,000; incorporators, R. S. Mantell, Ray Wirtz, J. E. Welch.

**Wausau, Wis.**—Schubring Motor Co.; to deal in motor cars, accessories, tires, etc.; capital stock, \$25,000; incorporators, L. H. Hall, F. Schubring and E. D. Widmer.

**Wilmington, Del.**—Frederickstown Eng. Corp., to manufacture motor cars and parts; capital stock, \$125,000.

**Wilmington, Del.**—Comet Automobile Co.; to manufacture all kinds of engines, motors, machines, etc.; capital stock, \$1,000,000.

**Wilmington, Del.**—Twin Tube & Rubber Co.; to manufacture inner tubes, tires and all kinds of rubber articles; capital stock, \$1,000,000; incorporators, F. D. Beck, George W. Dillman, M. L. Harty.

**Wilmington, Del.**—Aero Motors Corporation of America; to manufacture motor cars and aeroplanes; capital stock, \$500,000.

**Wilmington, Del.**—Pan-American Motors Corp.; to manufacture motors, cars, etc.; capital stock, \$1,000,000; incorporators, Norman P. Coffin, C. L. Rimlinger, Clement M. Egner.

**Wilmington, Del.**—North American Rubber Co.; capital stock, \$250,000.